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Comparing Perceptions Regarding Accommodation Strategies Used Between Adults with Hearing Loss and Their Communication Partners

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COMPARING PERCEPTIONS REGARDING ACCOMMODATION STRATEGIES USED BETWEEN ADULTS WITH HEARING LOSS AND THEIR COMMUNICATION PARTNERS

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ABSTRACT

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This study was conducted to see if there were differences in perceptions between a person with hearing loss and their communication partners regarding how well they felt the communication partner performed requested accommodations for the hearing loss. Factors were analyzed to see if they impacted differences in accommodation perception, one of which was degree of hearing handicap measured by the Hearing Handicap Inventory-Screening (Ventry & Weisman, 1982). Paired *t* tests were used to analyze differences in performance ratings while an analysis of variance or Kruskal-Wallis *H* test was used to evaluate the impact of the factors on differences in accommodation perceptions. There were 73 pairs of communication partners and persons with hearing loss whose responses were included in the analysis. Results indicated statistically significant differences such as communication partners viewed themselves as performing accommodations better than the person with hearing loss thought they did regarding face visualizing accommodations only. Two factors—hearing handicap score and length of knowing their pair—showed statistically significant differences in perceived accommodation performance. Both the person with hearing loss and communication partner rated the communication partner as less than excellent at accommodating

regardless of differences in perception. This information could be helpful for aural rehabilitation and counseling patients with hearing loss.

Keywords: hearing loss, accommodations, communication partner

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CHAPTER I

STATEMENT OF THE PROBLEM

Hearing loss can negatively affect quality of life in both a person with hearing loss and those they communicate with, primarily due to communication breakdowns. This can be most apparent in difficult listening situations such as a group environment or when communicating with background noise present (Caissie, Dawe, Donovan, Brooks, & MacDonald, 1998). A mismatch between a person with hearing loss's view of their quality of life and the significant other's view of the person with hearing loss's life has been noted in research (Preminger & Meeks, 2010). These findings implied the person with hearing loss and their significant other could have different views on how the hearing loss affected one another. This mismatch has been correlated with negative moods, which in turn suggest a negative mood and/or affect could relate to a lower perceived hearing-related quality of life (Preminger & Meeks, 2010).

Communication breakdowns can occur in those with hearing loss in many different environments but often occur in difficult listening environments such as conversing in background noise, listening to a voice from another room, talking on the telephone, listening in reverberant settings, and talking in group settings (Hétu, Getty, & Quoc, 1995; Hétu, Jones, & Getty, 1993). Common accommodations that could help alleviate some difficulties resulting from communication breakdowns include speaking more clearly and slightly slower, having the speaker keep their face fully visible and lit,

speaking closer to the person with hearing loss, and reducing background noise (Arlinger, 2003; Caissie et al., 2005; Hallam, Ashton, Sherbourne, & Gailey, 2008).

Persons with hearing loss might be more likely to attempt to control a conversation's topic and to talk more frequently than the listener when conversing with an unfamiliar communication partner (Caissie et al., 1998). In addition, they are less likely to ask for repetition and less likely to use repair strategies with someone unfamiliar (Caissie et al., 1998). Accommodations could be important for successfully communicating with a person with hearing loss and these accommodations could positively influence verbal communication and decrease communication breakdowns (Arlinger, 2003; Caissie et al., 2005; Walden, Busacco, & Montgomery, 1993). However, little research exists related to the perceptions of a communication partner's performance of a hearing related accommodation.

Purpose of the Study

The purpose of the current study was to see if a mismatch in viewpoints existed regarding a communication partner's accommodation performance and what factors might influence the viewpoints on this matter for both a person with hearing loss and their communication partners. Increased knowledge in this area could be helpful for clinicians designing aural rehabilitation sessions with patients and their communication partners regarding verbal communication strategies and other accommodations. This could lead to less communication breakdown and improved quality of life.

Research Questions and Hypotheses

Q1 Is there a significant difference between a person with hearing loss's perception of how well their communication partner performs requested accommodations and their communication partner's perception of how well they, themselves, perform the requested accommodations?

H1 How well a communication partner performs accommodations requested by the person with loss will be perceived as poorer by the person with hearing loss in comparison to the communication partner.

Q2 What factors relate to differences in perception between a person with hearing loss and their communication partner regarding accommodation performance?

H2 Factors such as age, type and length of relationship, type of hearing device used, length of hearing device use, frequency of hearing device use, specific accommodation, category of accommodation, and amount of congruence on degree of self-reported hearing handicap have a significant effect on differences in perception on the communication partner's accommodation performance.

CHAPTER II

REVIEW OF THE LITERATURE

Hearing Loss Prevalence

The National Institute on Deafness and Other Communication Disorders (2016) reported that close to 15% of adults in the United States of America reported some degree of hearing loss with the rate of hearing loss increasing with age. Effects of hearing loss on communication could vary depending on the degree of the loss but include decreased understanding of speech, especially in noisy environments, feelings of isolation and frustration, difficulty performing certain job duties, third party disability occurring, and listening fatigue (Arlinger, 2003; Hétu et al., 1993, 1995; Preminger & Meeks, 2010). Measuring a hearing handicap is also important as how much a hearing loss would affect the person's life did not consistently correlate with the audiometric results (Newman, Weinstein, Jacobson, & Hug, 1990). A specific degree of hearing loss does not affect all individuals equally, supporting the notion that the impacts of hearing loss on life and needed accommodations varied depending on the individual.

The Effects of Hearing Loss on Communication

Verbal communication is essential for most individuals and is often needed for a variety of different situations in a person's life (Preminger & Meeks, 2010; Weinstein & Ventry, 1983). When hearing loss is present, especially a hearing loss that impacts verbal communication, it could lead to detrimental effects on the quality of life for a person with hearing loss and his or her communication partners.

Hétu et al. (1995) reviewed previous research on how hearing loss caused by their occupation affected the lives of workers (occupational hearing loss). Findings suggested those with occupational hearing loss (typically a noise-induced hearing loss) needed up to a 10 decibel higher speech-to-noise ratio (SNR) than individuals with normal hearing sensitivity to communicate effectively with background noise present. For those employed somewhere with high sound levels, listening in the presence of background noise was a common occurrence. Thus, those with occupational hearing loss who still worked in an environment with high sound levels often spent more time trying to communicate in a difficult listening situation than those with normal hearing. Persons with occupational hearing loss might have other communication difficulties such as difficulty understanding on the phone, listening in reverberant environments, and conversing in group settings, which could lead to feelings of isolation, less social interaction, and a poorer quality of life (Hétu et al., 1995). These communication difficulties and feelings occur often for many with hearing loss, not only those with occupational hearing loss, and could have a negative impact on their verbal communication.

Jaworski and Stephens (1998) had 100 participants with hearing loss fill out a questionnaire asking the participants to list what types of situations they did not join a conversation in order to avoid admitting to a communication breakdown from their hearing loss. The participants had a moderate hearing loss in the better hearing ear and had a mean age of 72. As responses were open ended, responses varied. The main situations where participants avoided conversation were in group situations, in public, in noisy and open spaces, and when talking with strangers. The authors also found 45 of

their 100 participants reported avoiding conversations to prevent feelings of embarrassment from pretending to understand what was said, asking for repetition of what was said, or admitting to a communication breakdown occurring. The authors speculated this might be because to some individuals, social acceptance could be more important than feeling included in a conversation. This view could lead to increased feelings of isolation and reduced well-being in addition to the effects on communication.

Arlinger (2003) reviewed research regarding the negative effects of hearing loss and found a common theme was hearing loss could affect other individuals in addition to the person with hearing loss such as family members, coworkers, and other individuals with whom the person with hearing loss interacted. Arlinger also discussed more effective methods of communicating with a person with hearing loss including the communication partner allowing their face to be fully visible, speaking more clearly and slightly slower, and speaking in closer proximity to the person with hearing loss. Arlinger then discussed how uncorrected hearing loss could lead to feelings of isolation and exclusion for the person with hearing loss as well as lessened social activity, which might affect the person with hearing loss's family and friends in addition to the person with hearing loss.

In relation to Arlinger's (2003) suggestion on speaking more clearly, Caissie et al. (1998) analyzed certain features in conversations when five different adults with hearing loss spoke to familiar and unfamiliar communication partners. The five adult participants had bilateral sensorineural hearing loss with an average moderate-severe to severe hearing loss for both ears. The authors classified the five participants with hearing loss as "long time amplification users." The conversational features Caissie et al. analyzed

consisted of how many conversational turns occurred, how many words were spoken per turn, how many shifts of topic were geared toward the person with hearing loss's life, and how likely the person with hearing loss was to ask questions. For all factors analyzed, the authors found the person with hearing loss exhibited more controlling conversational behaviors when they were communicating with the unfamiliar communication partner than with familiar communication partners. Controlling behaviors for this study consisted of taking longer speaking turns, talking more frequently on topics regarding themselves, and not asking many questions. Caissie et al. speculated the person with hearing loss might be less likely to ask for repetition or to use repair strategies with someone with whom they were unfamiliar. They also suggested a possible reason for this controlling behavior was to reduce the amount of content they must listen to, which in turn gave less chances for themselves to mishear or not hear what the person said.

Hétu et al. (1993) reviewed the research available at that time on how acquired hearing loss could affect significant others. The authors found that in relation to communication between the person with hearing loss and their spouse, the person with hearing loss reported feeling fatigued from needing to ask for a statement to be repeated, feeling the spouse was not keeping their communication needs in mind (i.e., talking in the other room or talking with unnecessary noise in the background), and frustration from being left out of conversations. The spouses reported feeling fatigued by having to repeat things and angered that they felt the person with hearing loss did not make enough effort in trying to understand what they were saying. The authors emphasized the one-sided feelings by either the person with hearing loss or their spouse as focusing only on the person with hearing loss ignored the efforts and struggles of the spouse but focusing only

on the efforts of the spouse could ignore the needs of the person with hearing loss. The authors emphasized the feelings of both the person with hearing loss and spouse were related to the presence of the acquired hearing loss and could be somewhat remedied by accommodations.

Stephens, France, and Lormore (1995) gave a questionnaire to significant others of a person with hearing loss about their view of how the hearing loss influenced themselves. The authors also gave the questionnaire to the person with hearing loss, asking them how they thought their hearing loss affected their significant other. The authors did not mention whether the persons with hearing loss used any sort of amplification for their hearing loss. The questionnaire was modified to fit the party filling it out but asked the same questions. There were 52 couples with 26 females (age range of 14 to 96 years) and 26 males (age range of 22 to 89 years). Significant others were mainly spouses but five of the significant others were children, explaining the low minimum age of the participants. The authors found the most common hearing loss related problem for the significant other was when live speech occurred (when they were speaking to the person with hearing loss). This was reported by both the significant other and person with hearing loss. The most common accommodation by the significant other for the person with hearing loss, as reported by both the significant other and person with hearing loss, was having to repeat themselves. The authors did not mention whether the repetition of speech was reported as being effective or not. Both the significant other and person with hearing loss were aware of problems caused by the hearing loss and that the hearing loss influenced verbal communication between each other.

Hearing loss can negatively affect both the person with hearing loss and their communication partners. These effects include negative feelings, poorer quality of life, communication breakdowns, and efforts needing to be made by communication partners to help the person with hearing loss understand better; negative feelings experienced by the person with hearing loss such as isolation and exclusion, frustration felt by the person with hearing loss with regard to feeling the communication partner did not try hard enough to accommodate their hearing loss; and awareness by both parties that the communication partner must accommodate the hearing loss often (Arlinger, 2003; Hétu et al., 1993, 1995; Preminger & Meeks, 2010; Stephens et al., 1995). Even with hearing technology currently available, communication breakdowns can often occur when talking with a person with hearing loss, especially in less optimal situations such as a group setting and/or when communicating in background noise (Caissie et al., 1998). Multiple accommodations could be made for the person with hearing loss to allow the effects on communication from hearing loss to be decreased. Therefore, appropriate communication accommodation strategies are important in conversing with persons with hearing loss. Research study results discussed support many of the accommodation strategies as helpful when speaking with a person with hearing loss.

Types of Accommodations and Their Benefits

Many types of accommodations for a person with hearing loss exist with various levels of success. The types of accommodations can be separated into two categories: strategies for communicating with a person with hearing loss and environmental accommodations to help maximize the listening conditions for the person with hearing loss to overcome some of the negative effects of their hearing loss. Strategies for

communicating with a person with hearing loss consist of ways the communication partner could alter how they talk or what they do while talking that could help the person with hearing loss better understand what is being said. Environmental accommodations include the ways the communication partner could help make the person with hearing loss's environment more conducive for understanding speech.

Strategies for Communicating with a Person with Hearing Loss

Communication strategies could be helpful in reducing the difficulties from hearing loss. Caissie et al. (2005) looked at how clear speech intervention improved communication with a person with hearing loss over time. The authors chose two male participants (ages 73 and 74) as "talkers" and both talkers had spouses who were hearing aid users. One talker had instructions to speak clearer to his spouse to improve speech clarity (control method) and one talker participated in an official clear speech intervention (experimental method). The clear speech intervention included educating the talker on the aspects of clear speech such as articulation, pausing, and acoustic stress. The talkers' speech was recorded saying the Central Institute for the Deaf everyday sentences (National Technical Institute for the Deaf, 2009) at three different times: pre-intervention, one week after intervention, and one month after intervention. The authors used "listeners" to judge the clarity of the speech. Listeners included individuals with normal hearing and hearing aid users with diagnosed sensorineural hearing loss. Caissie et al. found even without intervention, asking a communication partner to speak more clearly yielded a slower rate of speech and improved speech clarity as judged by both normal hearing listeners and listeners with sensorineural hearing loss. As part of the clear speech intervention, which included educating the talker on the importance of

speech rate, the authors suggested that telling someone to talk clearer could lead to slower speech rate without lengthy intervention. While the control method showed improvements, the clear speech intervention yielded even clearer speech and better word understanding as judged by both types of listeners. The results were maintained over time, more so than the control method. This research suggested a simple request to speak more clearly could elicit better speech understanding if the communication partner performed the communication accommodation request, although this request might need to be repeated over time.

Caissie and Gibson (1997) researched the effectiveness of different types of requests for clarification by persons with hearing loss regarding repairing communication breakdowns in conversation. For this study, the authors used 25 adult participants (12 females and 13 males) with sensorineural hearing loss who had consistently used amplification. The participants had a mean age of 64 years with an average moderately severe hearing loss for the right ear and moderate hearing loss for the left ear. The authors also recruited 13 normally hearing adults (all female) to act as "unfamiliar conservational partners." These unfamiliar conversational partners had a mean age of 44 years, hearing thresholds better than 25 dB HL between 500 and 4000 Hz, and little experience communicating with people with hearing loss. From observing the conversations, the authors coded the repair strategies used by the conversational partners into categories: repetition, confirmation, elaboration, paraphrasing, and pretending what the person with hearing loss heard was correct. After documenting communication breakdown and repair strategies between the person with hearing loss and conversational partner, the authors made several observations. Overall, how the person with hearing loss

asked for clarification during a communication breakdown did not seem to affect the ease in repairing the breakdown except by asking for confirmation if what they heard was correct. The methods the conversational partner used to try to repair the communication breakdown did affect how well the breakdown was repaired. These methods mainly included full repetition, partial repetition, and paraphrasing. Based on their results, the authors suggested the communication partner could be an important factor in how and if communication breakdowns were repaired. How a person with hearing loss responded was important since almost every time, when the person with hearing loss asked for clarification, the conversational partner complied with some type of repair strategy while the conversational partner offered very few repair strategies when the person with hearing loss made no request for clarification. The authors suggested that while a person with hearing loss often needed to initiate the request for a communication strategy during a communication breakdown, the communication partners, as a whole, played a large role in the quality of breakdown repair. This implied that significant others could benefit from training or awareness of repair strategies for communication breakdown.

In relation to how communication partners could reduce communication breakdowns, Barnett (2002) listed appropriate communication methods and recommendations for physicians when communicating with patients who had a hearing loss while treating them. Barnett discussed the minimal training physicians receive in communicating with patients with hearing loss and how crucial effective communication was due to the importance of the medical information being relayed. Communication strategies for the physician that Barnett mentioned consisted of meeting the person with hearing loss's eyes before speaking, not blocking one's mouth, repeating information

when needed, writing notes if communication breakdown could not be repaired verbally, and asking the patient with hearing loss if they were satisfied with the communication quality. While Barnett's guidelines for communication were meant for medical conversations, they could be applied to conversations between a person with hearing loss and a significant other.

As Barnett (2002) discussed, a speaker ensuring their face is visible is important for speech understanding by a person with hearing loss. Walden et al. (1993) compared the benefit of visual cues when listening to speech for middle-aged and older adults. The authors recruited 40 males—20 in the age range of 35 to 50 years and 20 in the range of 65 to 80 years. The age ranges served to represent middle aged adults and older adults separately. All participants' hearing was categorized as a fairly symmetrical, bilateral, moderate-to-severe sensorineural hearing loss with word recognition affected by the loss (mean word understanding was in the low sixties in percentage for both age groups). The participants were all new hearing aid users, although the study was conducted in an unaided condition. The authors found both age groups benefitted from visual cues for speech understanding. In addition, Walden et al. tested speechreading ability when only visual cues were provided with no auditory input. The authors found older adults performed poorer on this test and did not have a definitive answer as to why. This result suggested amplification was more important for the older population. This was because when the communication became closer to visual-only (as it would be when someone with a more severe hearing loss was not using amplification or not using appropriate amplification), an older person with hearing loss was more likely to struggle decoding the verbal message. Even so, in the auditory plus visual scenario, both age groups performed

similarly well: sentence understanding improved approximately 50% (from about 42% to about 93%) when going from an auditory only condition to an auditory-visual condition. These results supported the accommodation of making sure the communication partner's face was fully visible to the person with hearing loss when the partner was speaking so maximum visual cues were given for both age groups.

Hallberg and Barrenäs (1993) evaluated the negative effects of noise-induced hearing loss on significant others. Ten female participants with an average age of 53 years (range 45 to 58 years) were asked questions about their male partner (married or cohabitated) with a severe noise-induced hearing loss. The results mentioned by the authors were not discussed in terms of how many male partners reported specific negative effects of noise-induced hearing loss but rather as main themes regarding these negative effects. The two main themes identified in the interviews with the female partners were the male partners did not recognize their own hearing loss and how the noise-induced hearing loss affected the couple's relationship. The authors also analyzed what type of strategies (both effective and ineffective) the female partners used to try to overcome the communication difficulties that resulted from the hearing loss, focusing on the strategies used by the female partners since the male partners often denied a hearing loss. These strategies included co-acting (both partners denied the hearing loss and its' related problems), minimizing (the female partners minimized the hearing loss effects but accepted some difficulties), mediating (the female partners accepted the struggles from the noise-induced hearing loss and tried to help the male partners overcome these struggles), and distancing (the female partners accepted the hearing loss and the problems it brought to their relationship but the hearing loss still led to communication being

severely impacted, which led to the female partners distancing themselves from the male partner). The authors analyzed the themes and common responses based on grounded theory, meaning the authors tried to formulate theories from the results. The authors found that while most of the partners with noise-induced hearing loss often chose not to admit to the hearing loss, the actions of the female communication partners greatly influenced how much the noise-induced hearing loss affected their relationship and communication.

Communication strategies could vary but overall research supported the communication partner speaking clearer, making eye contact before speaking, and keeping their mouth unobscured (Barnett, 2002; Caissie et al., 2005; Walden et al., 1993). Research also supported having the person with hearing loss initiate an accommodation request for maximum accommodation compliance (Caissie & Gibson, 1997). Communication partner compliance could also be very important in successful communication with a person with hearing loss (Hallberg & Barrenäs, 1993).

Environmental Accommodations for a Person with Hearing Loss

Limited research has been conducted on the efficacy of most environmental modifications to maximize listening conditions for a person with hearing loss to understand speech such as reducing background noise, choosing less reverberant environments to communicate in, and conversing in well-lit areas. Hallam et al. (2008) published comments by persons with hearing loss who had acquired profound hearing loss and their family members on how they applied environmental modifications for the hearing loss. One such strategy was teaching the family member to sit facing the light so the person with hearing loss could see their face well while talking. The authors found

20 out of 25 (80%) of their participants with hearing loss relied heavily on lip-reading, close proximity to the speaker, and decent lighting for effective communication. The efficacy of a speaker facing the light for speech understanding has not been discussed directly in research. For instance, Barnett (2002) suggested physicians should use environmental accommodations when communicating with a patient with a hearing loss. Modifications discussed included ensuring the least amount of background noise possible was present and the speaker's (physician's) face was well lit. Evidence-based research on the importance of visual cues implied that allowing a speaker's face to be fully visible by utilizing lighting directions could be helpful for a person with hearing loss in understanding what the speaker was saying (Walden et al., 1993). As background noise is often detrimental to speech understanding, even more so for those with hearing loss, reducing background noise and reverberation as an accommodation could also help with speech understanding for the person with hearing loss.

Gordon-Salant and Callahan (2010) investigated if closed captioning while watching television improved speech recognition in older adults. As closed captioning could improve the understanding of the television message and result in a lower volume needed, communication between the person with hearing loss and a communication partner could also improve with the use of closed captioning. Fifteen adults (six females and nine males, ages 59 to 82) with binaural amplification participated in the study. All participants fit the criteria of having bilateral sensorineural hearing loss and any vision problems corrected by glasses or contact lenses. A control group included younger, normal hearing participants with a mean of between 86 and 98% correct speech understanding without closed captioning and a mean close to 100% speech understanding

when using closed captioning. Select sentences were used for speech recognition testing from three television genres: news, drama, and game shows. For the participants, the authors found the mean word recognition score was significantly greater when the participants utilized closed captioning than when the participants did not, with or without hearing aids being used. Over the three types of television programs, speech understanding was 23% on average for no closed captioning and no use of hearing aids, 37% for no closed captioning with the use of hearing aids, 75% for using closed captioning alone, and 81% when hearing aids and closed captioning were used. The authors explained why the speech understanding with closed captioning was less than 100%—the aging brain of older adults could affect speed of reading. Closed captioning information tends to go across the screen quickly and some older adults have found the rate to be too quick for them to process (Jensema, 1987). While the study was related to older adults, the significant increase in understanding the television message with the use of closed captioning might be generalized to others with hearing loss in different age groups. When the television is louder to accommodate a hearing loss, it reduces the signal to noise ratio for conversations occurring near the television, which could impact communication between the person with hearing loss and a communication partner.

Factors Related to Accommodations for Hearing Loss

Age

The effects of hearing loss are variable depending on the individual but several factors are often related to how much a hearing loss has on an individual. Age is one factor in the existence of a hearing handicap. Wiley, Cruickshanks, Nondahl, and Tweed (2000) administered the Hearing Handicap Inventory for the Elderly-Screening (Ventry

& Weinstein, 1982) to 3,178 adults between ages 48 and 92 years. More older adults were found to have a hearing handicap than the other three age groups but once one accounted for hearing loss (which is more prevalent for older adults) as age increased, the chance of having a hearing handicap decreased. Generally, the highest percentage of hearing handicap, once accounting for hearing loss, was the youngest group (ages 48 to 59). This supported younger adults as being more likely to perceive a hearing handicap from their hearing loss than older adults and could be a factor in what accommodations a person with hearing loss might need. Wiley et al. hypothesized several reasons why older adults might report less of a hearing handicap in their literature review: older adults minimized health issues, older adults often had multiple health issues to mask difficulty with hearing, older adults had better coping skills for health problems, and older adults had less hearing demands in their lives. The authors did not mention this questionnaire was designed for the elderly and that 48, the lowest aged participant included in their study, was generally not considered elderly. Since this study suggested age could influence how much a hearing loss impacted a person, age could be a factor in needing accommodations for hearing loss.

Degree of Hearing Loss

Weinstein and Ventry (1983) administered the Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982) to 100 older adults (age range of 65 to 91). The participants' hearing loss ranged from 5 to 95dB HL (mean pure tone average of 38dB HL) in the better ear with most participants having a sensorineural hearing loss. The researchers found a significant correlation between a patient's pure tone average and their total hearing handicap score (Ventry & Weinstein, 1982). Although pure tone average

did not exclusively predict hearing handicap, the researchers also found participants who had a pure tone average over 40dB HL in the better ear almost exclusively had some reported hearing handicap. This suggested degree of hearing loss had a weaker, but still significant, correlation to hearing handicap. Generally, there was a higher likelihood of a hearing handicap for those with a moderate or worse sensorineural hearing loss (Preminger & Meeks, 2010; Weinstein & Ventry, 1983).

Understanding Speech in Noise

Preminger and Meeks (2010) researched factors concerning quality of life related to hearing loss. Their study had 104 participants (52 persons with hearing loss and 52 significant others) with the persons with hearing having a three-frequency pure tone average of at least 40 dB HL in both ears. The authors found that in the person with hearing loss group, there was a statistically significant decrease in quality of life as the degree of hearing loss increased (r = .32, p = .009), suggesting degree of hearing loss had some correlation with quality of life. In addition, poorer speech in noise test scores on the QuickSIN (Etymotic Research, 2001) and negative mood also correlated with a decreased quality of life (r = .32, p = .01). Thus, difficulty understanding speech in noise might also help predict a lower quality of life. Poor ability to understand speech in noise could affect a person's experiences in many common noisy environments such as restaurants, various work places, social events, and even in the car. Perhaps this would lead to avoidance of such environments, which might lead to isolation and decreased quality of life. Certain accommodations could increase speech understanding ability in noisy environments.

Amplification Devices

Brooks, Hallam, and Mellor (2001) compared questionnaire responses by pairs of persons with hearing loss and communication partners regarding impact of hearing loss on television viewing, person-to-person conversation, and group conversation. Persons with hearing loss were between 50 and 80 years of age and had a hearing loss between 35- and 65-dB HL. After conducting the interviews, the person with hearing loss was fit with appropriate amplification and questionnaires were completed again. For both the person with hearing loss and significant other, the distress regarding television viewing, person-to-person conversation, and group conversation decreased with improved amplification. Use of hearing aids improved access to sounds such as speech and environmental sounds. As a result, decreased accommodation occurrence by the communication partner was needed for the person with hearing loss since distress regarding person-to-person conversation was also decreased by both parties (for both group and one-on-one conversing). As a communication partner often acts as an interpreter for the person with hearing loss, improved group conversation could also lower the need for accommodations in group settings and reduce stress for the communication partner. This could perhaps improve performance of the still needed accommodations as there would be less accommodations to remember to perform. In addition, Brooks et al. suggested the use of amplification was a factor in accommodations being needed and how often.

Chen et al. (2016) found the use of a cochlear implant could improve psychosocial factors in both the cochlear implant user and their partners. These authors obtained their results via questionnaire for 43 pairs of cochlear implant users and their

partners with the mean age of the cochlear implant user being 62 years. Based on descriptive statistics, they found that for the cochlear implant user, the general categories of psychosocial benefits included improved quality of life, improved ability to verbally interact with others (rated the highest in occurrence), feeling less anxious and embarrassed when speaking to unfamiliar talkers, less activity limitations, less participation restrictions, and enjoying activities more. For the partner, these benefits included less frustration, less perceived need to provide accommodations, and improved social life. Regarding quality of life, both the cochlear implant users and their partners felt improvements were seen in aspects such as communication, participating in the community, less negative emotions felt, improved relationships, and higher self-esteem. These results suggested the use of a cochlear implant could alleviate some psychosocial difficulties for those with hearing loss severe enough to qualify for a cochlear implant and their communication partners. This improvement in psychosocial struggles could help decrease frustration from one or both parties and could alleviate some accommodations needed. While accommodation needs might often be lessened by the use of a cochlear implant, the authors found only improvements in difficulties regarding hearing loss, meaning accommodations might still be needed to some degree.

Aural Rehabilitation

Preminger (2002) measured the improvement in hearing handicap with the Hearing Handicap Inventory for Adults (Newman et al., 1990) and the Hearing Handicap Inventory for the Elderly (Ventry & Weinstein, 1982), and improvement in using communication strategies based on attendance at an aural rehabilitation course. Preminger also compared these improvements based on whether a person with hearing

loss attended alone or attended with a person they were close with (such a spouse or close friend). Thirteen persons with hearing loss attended with someone and 12 attended alone. Preminger found those with hearing loss who attended an aural rehabilitation class with someone had a much higher improvement in hearing handicap scores (62% improvement) than those who attended alone (8% improvement). This aural rehabilitation class discussed speechreading, auditory perception training, and communication strategies. After the class, 85% of those who attended with someone and 67% of those who did not attend with someone increased their use of communication strategies. Overall, the results suggested attending an aural rehabilitation course similar to Preminger's could improve use of communication strategies regardless if a significant other attended with a person with hearing loss. In addition, having someone attend with a person with hearing loss could have a statistically significant improvement in hearing handicap.

While appropriately fit amplification provides increased access to auditory information to most persons with hearing loss, the addition of an educational aural rehabilitation program could have additional positive effects. Kramer, Allessie, Dondorp, Zekveld, and Kapteyn (2005) performed a randomized control trial to see if a home education program for older adults with hearing loss and a significant other could improve communication and overall wellbeing as an addition to amplification for new and experienced hearing aid users. Forty-eight older adults with hearing loss (24 in the control) and 46 significant others (22 in the control) completed the program. The authors compared the results obtained right after the program and those obtained six months later to a control group who did not participate in the program. A home-based program was

chosen because older adults might have transportation and mobility limitations to attending a group program. The authors found a statistically significant improvement in communication strategies (regarding the benefits of speech reading) and a long-term (six months) positive effect on quality of life for both new and experienced hearing aid users ($p < .05$). They found no significant change in emotional response to the hearing loss. These results suggested that for hearing aid users, while hearing aids were an important part of aural rehabilitation, training programs and participation of a significant other were also helpful in aural rehabilitation.

Study Rationale

While hearing loss affects the quality of life of a person with hearing loss, some literature suggested there could be a mismatch between a person with hearing loss's view of their own quality of life and a communication partner's view of the person with hearing loss's life (Preminger & Meeks, 2010). This suggested a person with hearing loss and their communication partner could view the effects of hearing loss differently. Little direct research has been conducted into differences in perceptions of accommodations provided by a communication partner; thus, the purpose of the current study was to see if there was a mismatch between the two parties in views regarding accommodations, which might impact quality of life. Knowledge regarding a person with hearing loss's and communication partner's view on accommodations could be helpful for general aural rehabilitation and hearing loss counseling concerning communication strategies and environmental modifications for improving communication.

CHAPTER III

METHODS

Participants

A statistical power analysis was run to estimate the sample size needed for this study to have significant results. Based on alpha = .05, power = 0.80, and a two-tailed analysis, the estimated sample size of pairs needed was 64. A total of 146 paired participants (73 persons with hearing loss and their corresponding 73 communication partners) were included for analysis. An additional 178 participants (148 persons with hearing loss and 30 communication partners) completed the survey as well but were not included in the analysis as they had no matching paired participants. If either the person with hearing loss or the communication partner did not meet inclusion criteria, neither was included in the research. This last criterion eliminated five pairs—four from a disqualified communication partner and one from a disqualified person with hearing loss.

Tables 1 and 2 show the demographic information of the pairs of persons with hearing loss and their communication partners. Table 3 and Figure 1 include the audiological demographic information provided by the persons with hearing loss. In all demographic information collected for research question two, some categories had very low *n* values; thus, some categories were combined for statistical testing to be able to run.

Table 1

Relationship Demographics for Pairs of Participants

	Number of Pairs
Type of Relationship	
Spouse/significant other	56
Other relationship	17
Length of Relationship	
6-12 months	0
1-5 years	13
6-10 years	14
10+ years	46
Total Participants	73

Table 2

Age of Pairs of Participants

	PHL	CP
18-35 years	28	22
36-50 years	14	23
51-64 years	22	19
65+ years	9	9
Total Participants	73	73

PHL=Person with hearing loss
CP=Communication partner

Table 3

Amplification Information for the Persons with Hearing Loss

	Paired PHLs
Device(s) Used	
Acoustic Hearing Device	35
Electrical Hearing Device	18
No Hearing Device	20
Duration of Device Use	
Less than One Year	6
One Year or More	47

PHL=Person with hearing loss

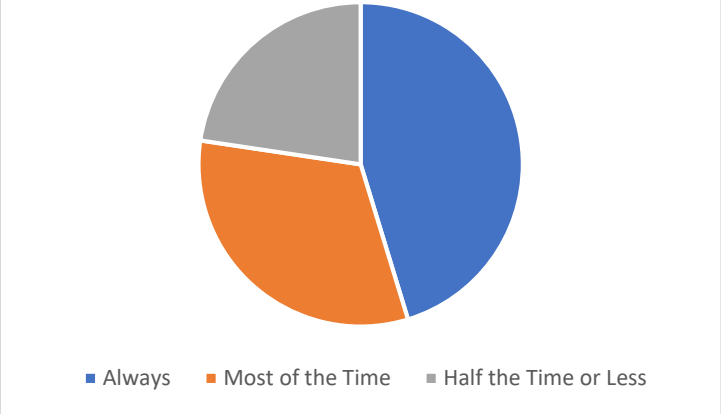

Figure 1. How often each day the persons with hearing loss wore their hearing device(s).

Procedure

Survey Development and Materials

One survey was developed for this study through Qualtrics Survey Software and is found in Appendix A. Participants were routed to one of two question sets based on whether the participant identified themselves as a person with hearing loss or the communication partner of a person with hearing loss. Questions developed for the person

with hearing loss focused on how they felt their communication partner accommodated their hearing loss. Questions developed for the communication partner focused on how they felt they accommodated the person with hearing loss's hearing difficulties. Both sets of questions were developed so the questions regarding accommodations were mirrored between the person with hearing loss and the communication partner for direct comparison. Accommodations included in the survey were derived from previous research (Arlinger, 2003; Barnett, 2002; Caissie et al., 1998, 2005; Stephens et al., 1995; Walden et al., 1993) as well accommodations specifically discussed in the *Learning to Hear Again: An Audiologic Rehabilitation Curriculum Guide* (Wayner & Abrahamson, 2000) and *Learning to Hear Again with a Cochlear Implant: An Audiologic Rehabilitation Curriculum Guide* (Wayner & Abrahamson, 1998). The validated *Hearing Handicap Inventory for Adults-Screening* and *Hearing Handicap for the Elderly-Screening* (Ventry & Weinstein, 1982) were also incorporated as part of the survey to capture perceived hearing handicap and to then compare the hearing handicap to differences in perceived accommodation performance.

Consent and Demographic Information

The statement of intent/consent information and survey were completed and supported by the Qualtrics secure website. Participants clicked on an online link to access the online survey. The survey began with a page providing information on the survey, a statement regarding Institutional Review Board approval of the study (see Appendix B), a statement of intent allowing potential participants to understand the purpose of the survey and research, the voluntary state of this survey, possible risks, and how consent was obtained. Participants read that pressing the continue button, moving

on from the statement page, and starting the survey to answer the questions constituted consent.

Two initial questions were asked that served to differentiate the type of participant (person with hearing loss versus communication partner) and to pair the responses of the person with hearing loss with the responses of their specific communication partner. One question was asked to verify the participant met the inclusion criteria. For this question, the participant checked all choices that applied to them where each choice was an inclusion criterion. The inclusion question was asked at the beginning of the survey and if the participant did not meet all criteria (they did not check mark each inclusion criterion), they were immediately routed to the end of the survey. Both groups were asked what type of relationship they had with their paired participant (who they were filling the survey out about), how long they had known the person they filled the survey out about, and how old they themselves were. This last set of questions was used to help answer the second research question.

To ensure paired responses between a person with hearing loss and their communication partner, both partners were asked to provide the first three letters of the person with hearing loss's last name, the person with hearing loss's month and date of birth, and in which state (if in the United States of America) the person with hearing loss lived. Two responses were only paired if both the person with hearing loss and communication partner answered all three pairing questions the same.

For the person with hearing loss, an additional three questions were asked regarding the type of hearing device they used in each ear, how often they used their hearing device(s), and how long they had been using their hearing device(s). The

communication partner was asked if the person with hearing loss they were filling the survey out about was less than 65 years of age or 65 years and older. This last question was crucial for providing the correct version of the Hearing Handicap Inventory-Screening (Ventry & Weinstein, 1982) for them to complete, which was based on the age of the person with hearing loss.

Accommodation Questions

For both the person with hearing loss and communication partner's question sets (see Appendix A), a maximum of 38 questions were posed. They included questions related to the types of accommodations the person with hearing loss had requested of their communication partner, how well the participant perceived the communication partner performed the accommodations requested, and how much of a handicap they felt the hearing loss was on the person with hearing loss's daily life.

Accommodation categories. Three accommodation categories were displayed in the survey: speaking, face visualizing, and environmental. Five different speaking accommodations, four face visualizing accommodations, and five environmental accommodations were included. For the speaking accommodation category, questions were asked regarding how well the communication partner performed accommodations that included speaking louder, speaking clearer, speaking more slowly, repeating/rephrasing what they said, and other speaking accommodations. For the face visualizing accommodation category, the questions included facing the person with hearing loss when they spoke; keeping their face clear of hands, clothes, or objects; getting the person with hearing loss's attention before speaking; and other facing visualizing accommodations. For the last category, environmental accommodations;

questions were asked regarding turning down/turning off sound sources such as music, radio, TV, etc.; sitting/standing on the person with hearing loss's better hearing side; adjusting lighting or moving to a better lit location; moving closer to the person with hearing loss; and other environmental accommodations.

For each accommodation in each category, the participant was asked if they/the person with hearing loss had requested the accommodation. If they marked yes, they were then asked to rate how well they felt they/the communication partner performed this accommodation. If they marked no, the rating of that accommodation was skipped and no analysis was performed for that accommodation for that participant. Ratings were based on a visual analogue scale that went from 1 (poor) to 5 (excellent). The participant could slide the bar on the device to select a number up to one decimal place between 1 and 5. The participant could see the numbers 1, 2, 3, 4, and 5 and where their marker was in relation to the whole numbers but could not see the precise decimal place they selected. For instance, if their marker was between 2 and 3, they could see an estimate of where their marker was between 2 and 3 but not the exact decimal place. There were no labels for any value other than 1 and 5. The labels were only provided so participants knew a lower number constituted worse accommodation performance and a higher number was better accommodation performance. The difference between each whole number (for example, the difference between 1 and 2) was equal, defining this scale as different than a Likert scale.

Hearing handicap questions. Hearing handicap was measured with the Hearing Handicap Inventory for Adults-Screening (Newman et al., 1990) for persons with hearing loss that were younger than 65 years of age and with the Hearing Handicap Inventory for

the Elderly-Screening (Ventry & Weinstein, 1982) for persons with hearing loss who were 65 years of age or older. The person with hearing loss's version of the *Hearing* Handicap Inventory-Screening was based on the age range they selected for themselves. The communication partner's version of the Hearing Handicap Inventory was based on the question given that asked how old the person with hearing loss was they filled the survey out about. When the communication partner completed the Hearing Handicap Inventory regarding the person with hearing loss, both the Hearing Handicap Inventory for Adults-Screening and the Hearing Handicap Inventory for the Elderly-Screening were modified slightly by changing any instance of the word "you" with "the person with hearing loss." This allowed the communication partner to answer the questions on how they felt the hearing loss was a handicap to the person with hearing loss. For both age groups and respondent types (person with hearing loss versus communication partner), the hearing handicap questionnaire included 10 questions about how the hearing loss affected the person with hearing loss with a choice of "Yes," "Sometimes," or "No." Each was assigned a point value of 4, 2, and 0, respectively, for post-survey scoring. The scores were totaled, which allowed for the person with hearing loss's hearing handicap to be categorized into "no handicap," "mild to moderate handicap," and "severe handicap," which had a range of 0-8, 10-24, and 26-40, respectively. Scoring was completed as directed by the questionnaires' authors.

A pilot survey was sent to the research advisors for this study who were faculty of the University of Northern Colorado's Audiology and Speech Language Sciences program. This allowed for inspection of the survey and corrections to any potential issues with survey design or questions before sending the survey to potential participants.

In addition, the survey was piloted with several close family members and friends of this researcher, none of whom participated in the official study. The faculty reviewed the pilot survey for relevancy relating to the research questions, suitability of order of questions, wording of questions, and if the answer choices were adequate. A few grammatical error and clarity edits were made but no significant changes were made after the pilot study was completed. The final version of the survey distributed to participants can be found in Appendix A.

Inclusion Criteria

Inclusion criteria for all participants included using English as a primary language, being 18 years of age or older, and knowing their paired partner for six months or longer. Persons with hearing loss inclusion criteria consisted of having a verified hearing loss in at least one ear and orally communicating with their communication partner. Degree of hearing loss was not considered; instead, the person with hearing loss was asked if the hearing loss impacted their ability to communicate orally. Degree of hearing loss was not factored since it was decided it would be difficult to get accurate responses of what degree of hearing loss a participant had. Amplification use, or lack thereof, did not exclude a participant.

The decision to include only those participants who at least sometimes communicated orally with their communication partner stemmed from the type of accommodation questions asked. All accommodation questions regarded accommodations that would help with oral communication breakdown due to a hearing loss. Participants could use sign language sometimes or with other communication

partners but in order to include them in the study, they had to at least communicate orally with the communication partner completing the study some of the time.

The communication partner inclusion criteria included the absence of a verified hearing loss and use of oral communication when communicating with the person with hearing loss. This was in addition to the age, language, and relationship length criteria the person with hearing loss also had.

Survey Distribution

The survey was distributed to potential participants by convenience, voluntary response, and snowball sampling in both online and non-online methods. Online methods included emailing known friends, family, students, professional contacts of the researcher, and through the social media platform, Facebook. On Facebook, participants were contacted both through status updates from the researcher's own Facebook account, through anyone who shared the researcher's status update, group postings by both the researcher and others who had seen the postings, and Facebook messages both by the researcher and others who had received the Facebook message regarding the study. Depending on what group the researcher was posting on, the posts on Facebook varied. The researcher identified as someone with a hearing loss in most posts on groups for those with hearing loss but not on personal Facebook statuses.

Non-online contact methods included word of mouth (by both the researcher and anyone who was aware of the study) and through the University of Northern Colorado's Speech-Language Pathology and Audiology Clinic. The second method included flyers displayed in the University of Northern Colorado's Speech-Language Pathology and Audiology Clinic that briefly described the study and provided the email address of the

researcher should a viewer want to participate or get further information. Two potential participants emailed the researcher and the survey link was emailed back to them. Students at the university were also told about the study in several settings at school. Participants were not paid for their time and there was no mention of compensation.

The survey was open May 24, 2019 through August 6, 2019. For social media, the survey was posted two times on each social media source. The second time was approximately one month after the first posting. The dates and times of the first posting varied based on the social media source. Those who were emailed directly received one reminder. Those who emailed the researcher directly only received the one email with the information.

Data Analysis

Potential differences in mean perceptions in how well the communication partner performed an accommodation between a person with hearing loss and their communication partner were the main focus of the current study. Differences in perceptions were calculated by taking the mean accommodation performance rating given by the person with hearing loss in the category being analyzed and subtracting it from the accommodation performance rating given by the communication partner. A positive difference meant the communication partner rated themselves higher than the person with hearing loss rated the communication partner. A negative difference meant the person with hearing loss rated the communication partner higher than the communication partner rated themselves. For comparisons between the person with hearing loss and communication partner that involved a combination of multiple scores (for instance, the overall accommodation score), a sum of all accommodation scores was divided by the

number of accommodation scores rated. Statistical tests used for data analysis varied for research questions one and two. Specific tests used and rationales are discussed in the following section.

No survey that had a paired respondent and was completed enough to gain some statistical information was thrown out. For instance, if a participant completed the information on the speaking accommodations but did not finish face visualizing accommodations, environmental accommodations, or hearing handicap, their responses would be used for the speaking accommodation analysis but not for the overall accommodation differences. With this same example, for the face visualizing, environmental, and hearing handicap sections, neither the participant or their pair's responses were included.

Research Question One

How well the person with hearing loss felt the communication partner performed a certain accommodation was compared to how well the communication partner felt they themselves performed a certain accommodation by taking the differences in an accommodation score or mean score between a person with hearing loss and communication partner. Dependent *t*-tests were run using these values to answer research question number one and see if any difference in performance perception was statistically significant.

Research Question Two

A secondary interest within the current study was to see what factors (if any) had a significant effect on differences in accommodation performance perceptions. Factors analyzed were age, type and length of relationship between the person with hearing loss and the communication partner, type of hearing technology device used, length of hearing device use, frequency of hearing device use, the specific accommodation, category of accommodations, and degree of self-reported hearing handicap. All factors were compared to any differences seen between a person with hearing loss and their communication partner's response. This was to see if there was a significant difference in variation in accommodation performance views based on one of these factors. The mean differences obtained in the aforementioned analyses were then compared for all factors listed in research question two using either an analysis of variance (ANOVA) test or the Kruskal-Wallis (nonparametric alternative to the one-way ANOVA). The Kruskal-Wallis *H* test was used for some analyses due to highly different *n* values between the different subfactors when the ANOVA normality assumption was not met.

Age, type of relationship, length of relationship, type of hearing device used, and specific accommodations were asked as forced choice, closed answer questions. For the section on self-reported hearing handicap of the person with hearing loss (which included 10 questions), responses were measured with the Hearing Handicap Inventory (Adult and elderly screening versions) on the subjective degree the hearing loss negatively impacted the person with hearing loss. Responses were evaluated for congruence on results from the communication partner on how much they thought the hearing loss handicapped the

person with hearing loss and on how much the person with hearing loss thought their own hearing loss handicapped themselves.

CHAPTER IV

RESULTS

Analyses Completed

Data were collected across multiple accommodations and factors, leading to many analyses being completed in an effort to fully answer the research questions. Means between the person with hearing loss and communication partner's ratings on accommodations were compared in multiple ways. It should be noted the number of pairs of participants for each analysis varied. Some participants did not use all 14 accommodations surveyed. In addition, the stricter criterion for the overall accommodation score lowered the *n*. This criterion required both participants in a pair to have answered at least three of five speaking accommodations, two of four face visualizing accommodations, and three of five environmental accommodations. This criterion applied for the overall mean of each accommodation category and the overall accommodation score across all accommodation categories. In addition, when looking at individual accommodation scores, if a participant did not mark that they had asked for a specific accommodation/their person with hearing loss did not ask for a specific accommodation, a score was not collected. If a paired participant said the accommodation had been requested but their pair did not, neither response was counted for that accommodation.

Of the persons with hearing loss who responded, those who wore a hearing device in at least one ear provided information about what hearing device(s) they wore, how

much of the day they wore the device(s) every day, and how long they had worn this type of hearing device. Devices used were combined into acoustic hearing device (unilateral/bilateral hearing aid or bone conduction hearing device user without a contralateral cochlear implant), electrical hearing device (unilateral or bilateral cochlear implant users including bimodal users), or no hearing device in either ear. The full combination of different hearing devices to choose from are provided in Appendix C. The questions for all demographic questions were forced choice so the survey participants had a finite number of choices from which to choose.

Research Question One: Overall Accommodation Analysis

To answer research question one, the difference in mean accommodation scores between the person with hearing loss and the communication partner was calculated for different accommodations. Difference was calculated by taking the person with hearing loss's score and subtracting it from the communication partner's accommodation score; a positive difference meant the communication partner rated themselves higher in accommodation performance than the person with hearing loss rated the communication partner.

To review, participants rated the performance of the communication partner performing accommodations for the hearing loss on a scale of 1 (poor) to 5 (excellent). While the maximum rating was 5 and since the visual analog scale started at 1, the maximum difference between a person with hearing loss's score and a communication partner's score was either 4 or a negative 4. To calculate the percent difference of the maximum possible difference between a person with hearing loss's score and their paired communication partner, the following equation was used:

$$\frac{CP\ mean\ score - PHL\ mean\ score}{4} \times 100$$

Since the current study was measuring how different two scores were between a person with hearing loss and communication partner and comparing those differences between others who were given the same scale, the denominator was fixed at the absolute value of the maximum difference possible. The percent difference using the equation above is further explained in Table 4.

Table 4

Explanation of Maximum Possible Percentage Difference

Whole Number Potential Differences in Scores between a PHL and CP	% Difference of the Maximum Possible Difference
1 vs 5	100
1 vs 4	75
1 vs 3	50
1 vs 2	25
1 vs 1	0

Results

Figures 3, 4, 5, and 6 show the mean communication partner performance scores separate from the mean person with hearing loss score for an accommodation category or individual accommodation. These figures depict the mean performance score for each participant type, allowing for differences in performance scores to be visually seen. In addition, these figures also depict if differences were statistically significant. Representing differences in performance perception in this mode allows a reader to see

that regardless of if a difference in performance perception existed or not, most participants did not rate the communication partner as excellent at accommodating.

In Figure 2, only the difference in performance rating for the face visualizing overall accommodation score was statistically significant of all the overall accommodation categories with a 6.75% difference in perception. Figure 2 also shows that even with the differences in scores generally being small, both the person with hearing loss and communication partner did not rate the communication partner's accommodation performance as 100%. Generally, the person with hearing loss rated the communication partner's performance as 67 to 81% and the communication partner rated their own performance as 74 to 83%. Also, face visualizing accommodations was the category where both parties rated the communication partner having the poorest performance.

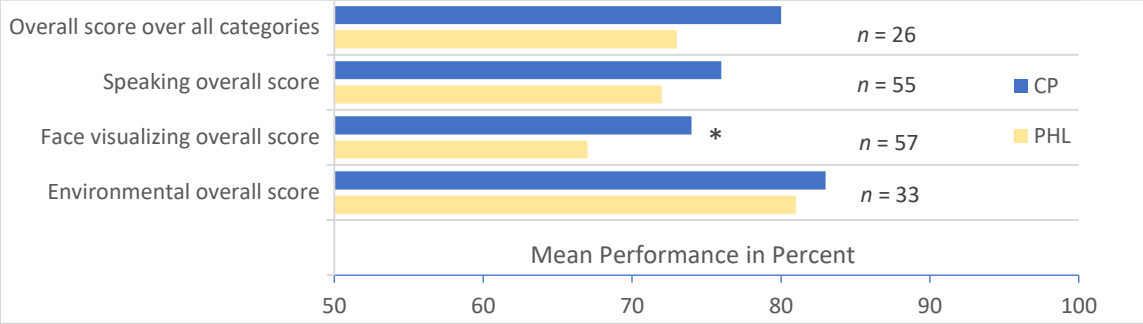

Figure 2. Performance ratings for the communication partner's accommodations as a percentage by accommodation category and overall score. * = $p < .05$.
n = number of pairs. CP=communication partner, PHL=person with hearing loss.

Figure 3 illustrates that no speaking accommodations showed a statistically significant difference. That being said, these results did show that, again, neither the person with hearing loss nor the communication partner rated the communication

partner's performance at 100%. The person with hearing loss rated the communication partner's performance as 67 to 77%. The communication partner rated themselves between 74 to 81%. Also, the speaking slower accommodation performance was rated the worst by both parties. Face visualizing accommodations was the most performed accommodation category with 57 of the 73 pairs reporting this accommodation being performed.

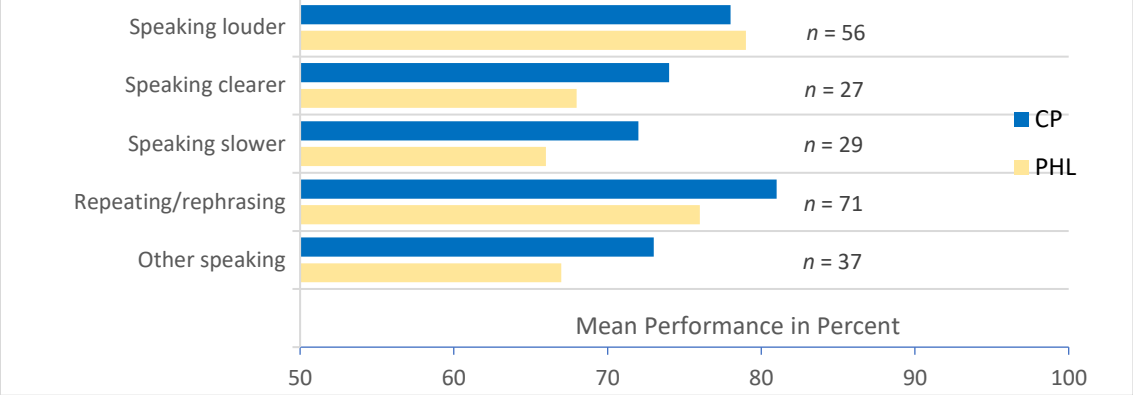

Figure 3. Performance ratings for the communication partner's accommodations as a percentage for speaking accommodations. No statistical significance was seen. *n* = number of pairs. CP=communication partner, PHL=person with hearing loss.

In Figure 4, a large and statistically significant difference (16%) in accommodation performance perception was seen for the communication partner getting the person with hearing loss's attention before speaking. In addition, for both the communication partner and person with hearing loss, the performance rating was generally lower than the speaking and environmental accommodations; the person with hearing loss's rating of the communication partner ranged from 58 to 74% and the communication partner's rating of themselves ranged from 73 to 75%. Also, the accommodation of repeating/rephrasing was the most commonly used accommodation in

the speaking accommodation category; across all accommodation categories, 71 of 73 pairs of participants used this accommodation.

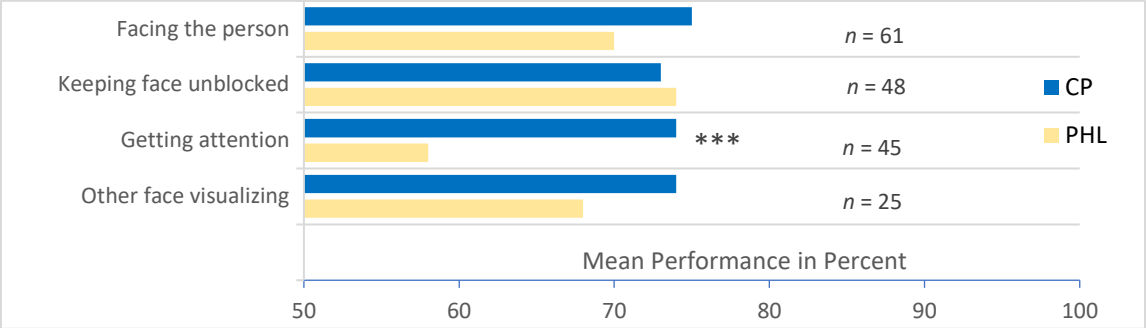

Figure 4. Performance ratings for the communication partner's accommodations as a percentage for face visualizing accommodations. *** = $p < .001$. *n* = number of pairs. CP=communication partner, PHL=person with hearing loss

The results shown in Figure 5 also yielded no statistically significant differences. The differences seen in environmental accommodations were the smallest in comparison to the other accommodation categories, showing the most congruence between the two parties. The largest difference between the two parties in an accommodation was 4.5% for adjusting the lighting in the room so the person with hearing loss could see the speaker's face better. Also, the person with hearing loss's performance rating of the communication partner varied from 77 to 83% and the communication partner's performance rating varied from 78 to 83%. Both ranges were higher in percentage than the other two accommodation category performance rating ranges.

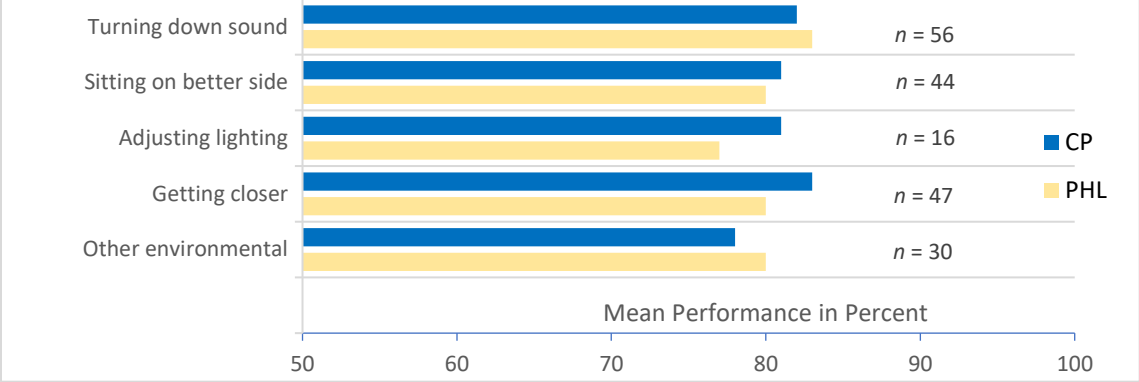

Figure 5. Performance ratings for the communication partner's accommodations as a percentage for environmental accommodations. No statistical significance was found. *n* = number of pairs. CP=communication partner, PHL=person with hearing loss.

Research Question Two: Analyses by Factor

After evaluating group differences for accommodations across pairs of participants, participants' responses regarding accommodations were further divided based on several preselected factors to see if any of the differences observed were closely related to these factors. Factors evaluated included age of both the person with hearing loss and the communication partner, length of the relationship, hearing device type, hearing device use each day, and amount of time they used hearing device(s). In addition, differences were evaluated by separating the participants based on hearing handicap score. Participants were then grouped into either no handicap, mild to moderate handicap, or severe handicap based on how the person with hearing loss completed the Hearing Handicap Inventory-Screening (Ventry & Weinstein, 1982) and then based on how the communication partner completed the Hearing Handicap Inventory-Screening regarding the person with hearing loss.

Due to low number in some groups within a factor, some groups were combined. For instance, age ranges 65-75 and 75+ were combined to 65+ due to a low *n* in the 75+

group. Relationships of spouse/significant other, other family member, friend, child, and parent were combined into two groups: spouse/significant other and other relationship. Amount of time wearing the device each day included always, most of the time, sometimes, rarely, and never. This was combined into always, most of the time, and sometimes or less. Since the survey allowed for 10 different combinations of hearing devices, responses were collapsed into three groups for analyses: (a) no hearing devices in either ear, (b) acoustic hearing devices (unilateral/bilateral hearing aid or bone anchored hearing device without a contralateral cochlear implant), and (c) electric hearing devices (unilateral or bilateral cochlear implant including bimodal users).

While the overall *n* for research question number one was often large enough based on the power analysis, when it came to evaluating the different factors, some groups had uneven and sometimes very small *n* values. To ensure ANOVA's assumption of homogeneity of variance was not violated, Levene's test of homogeneity was used. Using the standard *p* value and if Levene's test yielded a *p* value less than .05, the ANOVA analysis was not used and the non-parametric alternative, the Kruskal-Wallis test, was used instead. Data included in Tables 5, 6, 7, and 8 present data relevant to the different factors analyzed including the *n* values for the different groups for each factor, the difference in accommodation perception between the communication partner and person with hearing loss if the groups passed Levene's test of homogeneity, and the significance value for either the ANOVA or Kruskal-Wallis test. Table 5 presents the overall accommodation differences, Table 6 is for speaking accommodations, Table 7 presents face visualizing accommodations, and Table 8 is for environmental accommodations.

Table 5

Effects of Participant Related Factors on the Overall Accommodation Performance Score

	n	Difference	Levene's homogeneity test	*p*-value
Type of Relationship				
Spouse/Significant other	20	0.31	Pass	0.79
Other relationship	6	0.21		
Age of PHL				
18-35 years	10	0.09		
36-50 years	5	0.41	Pass	0.70
51-64 years	8	0.32		
65+ years	3	0.68		
Age of CP				
18-35 years	6	0.06		
36-50 years	9	0.34	Pass	0.88
51-64 years	6	0.35		
65+ years	5	0.41		
Length of Knowing the Other Person				
6-12 months	0			
1-5 years	7	-0.10	Pass	0.01*
6-10 years	2	1.65		
10+ years	17	0.29		
Device Time per Day				
Always	12	0.14		
Most of the time	4	0.97	Does not pass	0.66†
Sometimes or less	4	0.01		
Years with Device				
More than one year	19		Could not run	Could not run
Less than one year	1			
Type of Device				
None	6	0.33		
Acoustic	12	0.50	Pass	0.31
Electric	8	-0.05		
HHI Score by CP				
None	0			
Mild to moderate	13	0.28	Pass	0.95
Severe	13	0.30		
HHI Score by PHL				
None	0			
Mild to moderate	7	0.57	Pass	0.28
Severe	19	0.19		

† Kruskal-Wallis analysis. All other *p*-values are from ANOVA analysis.
Difference=Difference in accommodation perception between both parties in a pair

Table 6

Effects of Participant Related Factors on Speaking Accommodation Performance Scores

	n	Difference	Levene's homogeneity test	*p*-value
Relationship				
Spouse/Significant other	43	0.18	Pass	0.99
Other relationship	12	0.19		
Age of PHL				
18-35 years	22	0.11	Pass	0.93
36-50 years	12	0.30		
51-64 years	14	0.18		
65+ years	7	0.23		
Age of CP				
18-35 years	16	0.12	Pass	0.88
36-50 years	19	0.17		
51-64 years	12	0.35		
65+ years	8	0.10		
Length of Knowing the Other Person				
6-12 months	0		Pass	0.91
1-5 years	9	0.14		
6-10 years	11	0.27		
10+ years	35	0.17		
Device Time per Day				
Always	20		Does not pass	0.39†
Most of the time	14			
Sometimes or less	8			
Years with Device				
More than one year	37	0.10	Pass	0.84
Less than one year	5	0.18		
Type of Device				
None	13	0.42	Pass	0.49
Acoustic	26	0.12		
Electric	16	0.09		
HHI Score by CP				
None	1	1.48	Pass	0.21
Mild to moderate	24	0.07		
Severe	29	0.20		
HHI Score by PHL				
None	0		Pass	0.91
Mild to moderate	19	0.15		
Severe	35	0.17		

† Kruskal-Wallis analysis. All other *p*-values are from ANOVA analysis.
Difference=Difference in accommodation perception between both parties in a pair

Table 7

Effects of Participant Related Factors on Face Visualizing Accommodation Performance Scores

	n	Difference	Levene's homogeneity test	*p*-value
Type of Relationship				
Spouse/Significant other	45	0.30	Pass	0.52
Other relationship	12	0.12		
Age of PHL				
18-35 years	24	0.24		
36-50 years	12	0.32	Pass	0.53
51-64 years	16	0.12		
65+ years	5	0.77		
Age of CP				
18-35 years	16	0.32		
36-50 years	19	0.15	Pass	0.85
51-64 years	14	0.25		
65+ years	8	0.47		
Length of Knowing the Other Person				
6-12 months	0			
1-5 years	12	0.00	Pass	0.24
6-10 years	10	0.63		
10+ years	35	0.25		
Device Time per Day				
Always	20	0.26		
Most of the time	13	0.39	Does not pass	0.77†
Sometimes or less	7	0.08		
Years with Device				
More than one year	38	0.25	Pass	0.46
Less than one year	2	0.73		
Type of Device				
None	17	0.26		
Acoustic	25	0.37	Pass	0.63
Electric	15	0.10		
HHI Score by CP				
None	2	1.48		
Mild to moderate	27	0.36	Pass	0.80
Severe	27	0.10		
HHI Score by PHL				
None	0			
Mild to moderate	22	0.56	Pass	0.045*
Severe	34	0.09		

† Kruskal-Wallis analysis. All other *p*-values are from ANOVA analysis.
Difference=Difference in accommodation perception between both parties in a pair

Table 8

Effects of Participant Related Factors on Environmental Accommodation Performance Scores

	n	Difference	Levene's homogeneity test	p-value
Type of Relationship				
Spouse/Significant other	24	0.06	Pass	0.94
Other relationship	9	0.03		
Age of PHL				
18-35 years	10	0.01		
36-50 years	6	0.38	Pass	0.79
51-64 years	12	-0.10		
65+ years	5	0.10		
Age of CP				
18-35 years	8	-0.16		
36-50 years	11	0.18	Pass	0.90
51-64 years	7	0.05		
65+ years	7	0.08		
Length of Knowing the Other Person				
6-12 months	0			
1-5 years	7		Does not pass	0.41
6-10 years	3			
10+ years	23			
Device Time per Day				
Always	14	-0.05		
Most of the time	5	0.33	Pass	0.63
Sometimes or less	6	-0.26		
Years with Device				
More than one year	24		Could not run	Could not run
Less than one year	1			
Type of Device				
None	8	0.29		
Acoustic	15	0.24	Pass	0.16
Electric	10	-0.42		
HHI Score by CP				
None	0			
Mild to moderate	15	0.15	Pass	0.58
Severe	18	-0.04		
HHI Score by PHL				
None	0			
Mild to moderate	11	-0.10	Pass	0.54
Severe	22	0.12		

All p-values are from ANOVA analysis.
Difference=Difference in accommodation perception between both parties in a pair

Notable Findings for Research Question Two

The ANOVA and Kruskal-Wallis analyses only resulted in two factors with statistically significant results in only one accommodation category each. The overall mean accommodation score performance showed a statistically significant difference between the different lengths of knowing the other person surveyed. The hearing handicap score from the persons with hearing loss was statistically significant only in the face visualizing accommodation category. Interestingly, no statistical significance was seen in any of the analyses that did not pass Levene's test of homogeneity (non-parametric analyses); thus, only ANOVA results are discussed further.

For length knowing the other person for the overall accommodation category, Figure 6 shows the mean percentage difference for the different lengths of knowing the other person for the overall mean accommodation score and the statistical significance between groups. When the Bonferroni post hoc test was run, a significant difference was found between those knowing each other one to five years and those knowing each other 6-10 years. Those knowing each other 6-10 years had a much larger discrepancy in accommodation performance perception (41% difference); the communication partner thought they accommodated better than the person with hearing loss thought the communication partner did.

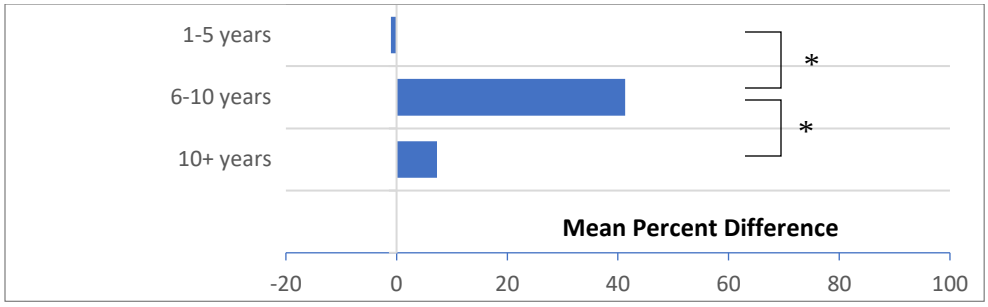

Figure 6. Difference in overall mean accommodation performance scores for pairs of participants for length of knowing the other person. * = $p < .05$

Those knowing each other one to five years generally had similar perceptions on how well the communication partner accommodated the person with hearing loss; the person with hearing loss rated the communication partner as only 3% better at accommodating than the communication partner rated themselves. That being said, when looking at the mean score by the person with hearing loss and communication partner separately (not the difference between the scores), neither party felt the communication partner's performance was 100% for this accommodation (see Figure 7).

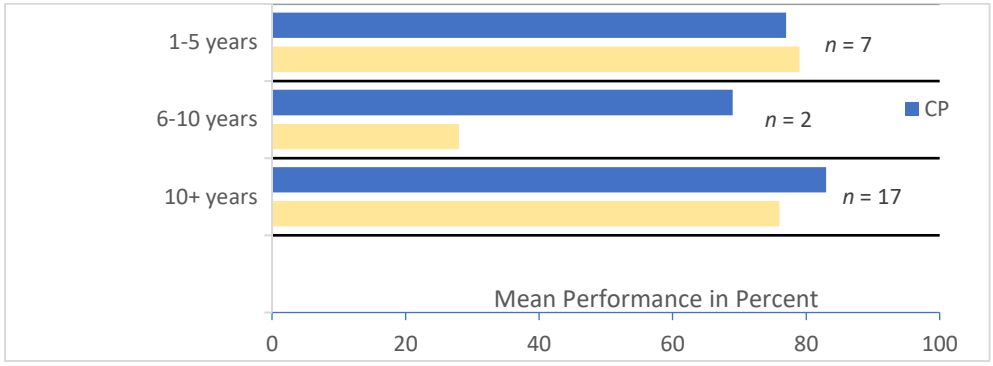

Figure 7. Performance ratings for the communication partner's overall accommodations as a percentage for length of knowing the other person. CP=communication partner, PHL= person with hearing loss.

Pairs who knew each other 6-10 years and pairs who knew each other 10+ years also showed statistically significant differences where again those who knew each other 6-10 years had a 41% difference and those knowing each other 10+ years had a much smaller discrepancy of 7%. The communication partner rated themselves higher than the person with hearing loss did for both the 6-10 year and 10+ year groups. No statistically significant difference was found between the performance difference for those who knew each other one to five years and those who had known each other 10+ years.

It should be noted the *n* for the 6-10 years group for length of knowing the other person for the total accommodation score was two pairs. However, Levene's test of homogeneity was still met, which allowed for the ANOVA analysis. Even so, another comparison was run with only two groups—knowing the other person six months to 10 years and knowing the other person over 10 years. For this, no accommodation category had statistically significant results, i.e., for the data collected, no difference between a person with hearing loss's rating and a communication partner's rating was statistically significant.

Hearing Handicap

The difference in raw Hearing Handicap Inventory (Ventry & Weinstein, 1982) scores between the communication partner's rating of the person with hearing loss's hearing handicap and the person with hearing loss's rating of their own hearing handicap was a mean of -2.37. As a participant could have rated the hearing handicap on a scored scale of 0 to 40, this indicated the person with hearing loss rated their handicap 2.37 points more severe out of 40 than the communication partner.

Beyond simply analyzing a difference in raw scores, Hearing Handicap Inventory (Ventry & Weinstein, 1982) scores were statistically compared in two ways: looking at the difference in accommodation performance scores and comparing to the degree of hearing handicap rated by either the communication partner or the person with hearing loss. Raw Hearing Handicap Inventory scores for each participant were converted to three degrees of hearing handicap: "no handicap," "mild to moderate handicap," and "severe handicap." The mean accommodation performances scores for each accommodation category were compared to how the person with hearing loss rated their own hearing handicap. Then the mean accommodation scores for each accommodation category were compared to how the communication partner rated the person with hearing loss's hearing handicap. Details on how hearing handicap ratings were chosen are listed in Chapter III.

For comparing both the hearing handicap measured by the communication partner and the hearing handicap measured by the person with hearing loss, a comparison was then made for the mean perception differences in the overall accommodation performance score, overall speaking accommodation score, overall face visualizing accommodation score, and overall environmental accommodation score. Only the overall face visualizing accommodation score yielded a statistically significant difference in accommodation performance perception. In addition, this accommodation category's statistical significance was only seen based on the person with hearing loss's hearing handicap rating of themselves—not for when the communication partner rated the person with hearing loss's hearing handicap.

A statistically significant difference ($p < .05$) in accommodation performance perception between the group of persons with hearing loss who rated their own hearing handicap as mild to moderate and the group that rated their hearing handicap as severe. No groups rated the hearing handicap as "no hearing handicap" so this handicap rating is not discussed further. One finding was both groups had the person with hearing loss rating the communication partner's performance as poorer than the communication partner rated themselves. Another finding indicated the mild to moderate group had a larger difference in accommodation performance scores. As seen in Figure 8, even though the difference in accommodation perception for the severe hearing handicap group was small (2.3%) for overall face visualizing accommodations, both parties did not feel the communication partner performed the accommodations at 100%. The person with hearing loss rated the communication partner's performance as 67 to 68%. The communication partner rated their own performance as 70 to 81%.

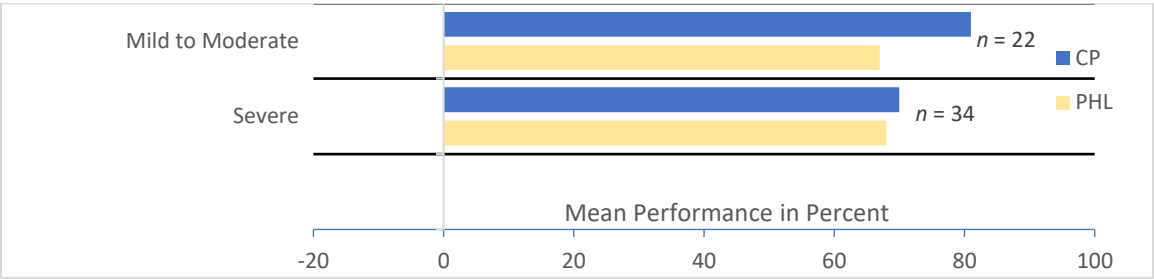

Figure 8. Performance ratings for the communication partner's face visualizing accommodations as a percentage for the person with hearing loss's rated hearing handicap. CP=communication partner, PHL= person with hearing loss.

Many subfactors analyzed for research question two did not have a statistically significant difference between the amount of agreement/disagreement regarding accommodation performance. This might be explained by the low *n* values for certain

categories. With small *n* values in certain groups, the probability of type II error increased. Type II error made it harder to find statistical significance, meaning it is possible that with a larger *n* value, statistical significance could have been seen in this study. A larger *n* would help determine if there was a true difference or not in accommodation perception. There was high confidence that the statistical significance seen in this study was true because the probability of type II error was higher.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Overall Interpretations

The results of the study showed a statistically significant difference in perception of accommodation performance between a communication partner and person with hearing loss in certain accommodation areas but not in most. The hypotheses for research questions one and two both predicted a difference in accommodation performance perception between the two parties. Some results did support the hypotheses but some accommodation performance differences did not. One result not considered by the researcher involved the mean accommodation score by both the communication partner and person with hearing loss that showed both sides felt the communication partner's performance was not excellent. This was not unexpected considering Hétu et al.'s (1993) work. Hétu et al. found spouses of those with hearing loss reported being fatigued and angered as they felt their spouse with hearing loss did not try hard enough to understand what they were saying. This could lead to poorer performance in certain accommodations due to fatigue or perhaps frustration and could help explain the communication partner's rating of themselves as less than 100%. These authors also found the person with hearing loss felt their spouse was not being mindful of their communication needs, which could be taken as not performing accommodations they felt they needed. This could also explain the person with hearing loss's performance rating of the communication partner as less than 100%.

In general, in those factors and comparisons that showed statistically significant differences, there was a discrepancy in perception of accommodation performance between a communication partner and a person with hearing loss where the communication partner generally rated themselves higher than the person with hearing loss rated them. This did not indicate which accommodation perception was correct (if either were) as both the performance rating by the person with hearing loss and by the communication partner were subjective and based on one person's perception of the other person or themselves. It did tell us a discrepancy existed, which could be a counseling tool when a hearing healthcare provider is with a person with hearing loss and their communication partner.

On average, even when both parties had similar views on how the communication partner accommodated the hearing loss, both parties did not select the highest rating (excellent) for how the communication partner performed the accommodation. While in almost every comparison the communication partner rated their performance as better than the person with hearing loss's performance of the communication partner (whether statistically significant or not), the communication partners still felt they were not excellent.

Research Question One

Face visualizing accommodations was the only category that showed statistically significant differences for research question one. Overall face visualizing accommodations showed a 7% higher performance rating by the communication partner than by the person with hearing loss. As visual cues could be beneficial (Walden et al., 1993), ensuring the communication partner's face is fully visible to the person with

hearing loss is recommended. While the difference in perception of accommodation performance was fairly small, beyond statistical significance or a difference in perception, both parties did not feel the communication partner's accommodation performance was 100%. The person with hearing loss group rated the communication partner's performance with face visualizing accommodations at 67% and the communication partner rated their own performance as 74%. On a subjective level, both the person with hearing loss and communication partner felt the communication partner could improve their face visualizing accommodation performance.

These results regarding face visualizing accommodations suggested that while the difference in performance perception was somewhat small, when counseling a person with hearing loss and their communication partner during an audiology appointment, aural rehabilitation class, or similar, a discussion about how a communication partner could improve their face visualizing accommodation performance would be warranted since visual cues could improve conversational understanding for the person with hearing loss (Walden et al., 1993). This could open up dialogue on why both parties felt the communication partner's performance was not excellent and could introduce methods to remedy the performance.

The other statistically significant result for research question one was getting the person with hearing loss's attention before speaking—one of the researched face visualizing accommodations. The performance rating for a communication partner getting the person with hearing loss's attention before speaking to them saw a statistically significant difference of 17%; the communication partner rated their own performance as 74% regarding getting a person with hearing loss's attention before speaking while the

person with hearing loss rated the communication partner at 58%. This result showed a large difference in perception as both parties felt the communication partner was not "excellent" at getting the person with hearing loss's attention. The word "excellent" was described as what a 5 (100%) would have been on the visual analog scale in the survey. This agreement between parties on the communication partner's non-excellent performance also supported a conversation with patients on how a communication partner could improve on this accommodation. The importance of visual cues has been noted in research (Walden et al., 1993). Getting a person with hearing loss's attention before speaking allows them to look at the speaker's face from the beginning of the speaker's conversational turn. Walden et al. (1993) also found adding visual cues to auditory information could improve sentence understanding from around 42% to around 93% for middle and older adults (with likely similar or better results for younger adults). Any face visualizing accommodations, including getting a person with hearing loss's attention before speaking, could have the potential of improving their sentence understanding by around 50% (Walden et al., 1993) and lower how often the communication partner would need to repeat what they said and lower communication breakdown.

Research Question Two: Differences Based on Factors

The analyses used to answer research question two examined hypothesized reasons for differences in accommodation performance perception. Factors included type of relationship between the person with hearing loss and communication partner, age of the person with hearing loss, age of the communication partner, length of knowing the other person, how much time each day the person with hearing loss wore their device (if

applicable), how many years the person with hearing loss had been wearing a hearing device (if applicable), type of hearing device (if applicable), and Hearing Handicap Inventory-Screening (Ventry & Weinstein, 1982) scores. The analyses resulted in two factors that had statistically significant differences between groups: the length of knowing the paired participant for the overall accommodation score and the Hearing Handicap Inventory-Screening score by the person with hearing loss for overall face visualizing accommodations.

Length of Knowing the Paired Person

In comparing how long the survey respondent knew their paired participant to accommodation performance perception differences, only the overall accommodation score was statistically significant in mean differences. A statistically significant difference was seen between the accommodation performance for knowing each other 1-5 years versus 6-10 years, and for 6-10 years versus 10+ years. The 6-10 years group had the largest difference in accommodation perception. No significant difference was seen for 1-5 years versus 10+ years. For both factors, even the communication partner, while viewing themselves as better at accommodating, knew they were not excellent (not 100%) at accommodating the hearing loss.

No research-based explanation was available as to why there was a performance perception difference between different lengths of knowing the other person. Again, even the communication partner did not rate themselves excellent at accommodating the hearing loss, which suggested that when talking with a pair in a hearing healthcare setting, discussing what might be causing the lower performance scores and how to

remedy this could be beneficial for all pairs but especially for those who have known each other 6-10 years.

Hearing Handicap Scores

Hearing handicap scores were also compared to differences in accommodation perceptions. The person with hearing loss filled out the Hearing Handicap Inventory-Screening (Ventry & Weinstein, 1982) appropriate to their age (two versions of the Hearing Handicap Inventory-Screening were available based on if the survey taker was under the age of 65 or if they were 65 or older). They responded to questions about how much they felt their hearing loss was a handicap in different aspects of their lives. The communication partner filled out the Hearing Handicap Inventory-Screening appropriate to the person with hearing loss's age and filled out questions about how much they thought the hearing loss was a handicap to the person with hearing loss. As discussed before, so few participants marked the handicap as "no handicap" that no statistical analyses could be performed for this degree of hearing handicap.

As discussed, the mean difference in scores between the communication partner's rating of the person with hearing loss's hearing handicap and the person with hearing loss's rating of their own hearing handicap was -2.14. This difference indicated the person with hearing loss rated their handicap as 2.14 more severe out of 40 than the communication partner. No standardized difference was found to determine if a communication partner's hearing handicap score of the person with hearing loss was significantly different than that for the person with hearing loss; thus, it could not be said for certain if a difference of -2.14 was statistically significant or not. That being said, Newman, Weinstein, Jacobson, and Hug (1991) determined that a statistically significant

change in the Hearing Handicap Inventory for Adults-Screening score for a person with hearing loss over time was 8.8 points. Newman, Jacobson, Hug, Weinstein, and Malinoff (1991) said for the Hearing Handicap Inventory for the Elderly-Screening, a significant change was 9.3 points. These criteria by Newman, Jacobson et al. and Newman, Weinstein et al. were calculated for measuring a hearing handicap score change within the same person—not between two people's hearing handicap scores about one of the two.

Preminger and Meeks (2010) compared full Hearing Handicap Inventory (Ventry & Weinstein, 1982) scores between a person with hearing loss and their significant other. Preminger and Meeks used the 14-point difference criterion typically used to evaluate a true change in a person with hearing loss's full hearing handicap score over time. Following Preminger and Meeks's line of applying the true change value for comparing a hearing handicap score between a person with hearing loss and a significant other, the current study used the 8.8 and 9.3 true point change values for the screening version of hearing handicap scores. Since the difference between the inventory scores for both parties was -2.14, a true difference was not seen between the communication partner's view of how much the hearing loss handicapped the person with hearing loss and the person with hearing loss's view of how much their own hearing loss handicapped them.

Beyond both parties having congruence in how much they felt the hearing loss handicapped the person with hearing loss, both parties also generally rated the hearing handicap high. On average, the person with hearing loss rated their own handicap as 26.94 out of 40, which was considered a severe hearing handicap. The communication partner, on average, rated the person with hearing loss's handicap as 24.80 out of 40.

This score was considered a mild to moderate hearing handicap but was on the higher end of this category where 25.00 was considered severe.

When comparing differences in accommodation performance perceptions to the person with hearing loss's own hearing handicap score, statistical significance was found only for overall face visualizing accommodations. There was a 14% difference for the mild to moderate hearing handicap score and a 2% difference for the severe hearing handicap group, suggesting that when the person with hearing loss thought their hearing loss handicapped them more, a statistically significant higher likelihood existed for both parties to be in agreement about how well the communication partner accommodated the hearing loss. As with almost all other results from the current study, both parties again did not rate the communication partner as excellent at accommodating the hearing loss.

Limitations

While many factors were controlled for as much as possible, there were still limitations to this study. One limitation involved the low number of participants who were over the age of 75. While this low number was likely due to the lower numbers in this age range using social media and email (the survey information was primary sent through social media and email), having more responses from this age range would allow for more complete understanding of whether age could be a factor on accommodation performance perception differences. The topic of participants likely being users of social media brought another limitation. While social media use is higher in younger and middle-aged adults, some in this age range still do not use social media. The survey was geared toward those who used social media (except for the few participants who were emailed the survey upon their own request); thus, perhaps there could be a relationship

between the accommodation performance perceptions in those who used social media and those who did not.

Another limitation regarded participants' responses. While not known definitively, there could have been some influence of a participant on their partner's survey responses. As most of the paired respondent's relationships were "spouses/significant others," the likelihood of these participants taking the survey in the same household as their paired respondent was higher. It is possible the participants discussed the survey before both parties completed it despite the instruction on the survey not to. This is a limitation to online surveys in general and could not have been avoided without changing the survey to "in person only," which would have likely decreased the *n* value.

Future Research

The results of this study yielded many potential future research directions. As all responses in this study were quantitative, future research could include looking at these accommodation areas with a more qualitative approach. Using open-ended questions could yield more information and give researchers the ability to understand further the reasoning behind the performance perceptions related to accommodations. For example, asking what a person with hearing loss felt the communication partner could do better could add some insight into what was causing the difference in accommodation performance perceptions. Similarly, asking the communication partner what might be preventing them from feeling they performed the accommodation better could gain similar insight.

Also, no questions for this study were geared to answer if the differences in performance perception could affect the relationship between the person with hearing loss or communication partner. In future, more emotional and relationship areas could be analyzed regarding how well accommodations were performed. For instance, the use of questionnaires to analyze satisfaction with the relationship could be used and if this related to accommodation performance perception discord.

Another future direction for the research gathered in this study could include measuring the use of a remote microphone as an accommodation. A remote microphone would be defined as a personal microphone a communication partner would wear to transmit their voice directly to the person with hearing loss's hearing devices. Research could look at the compliance with this hearing accessory. It would also be beneficial in a future study to clarify to the study participant if the accommodations they were rating themselves/their communication partner were with or without the use of a remote microphone. It was possible the ratings given during the current study had some ratings with the communication partner using the remote microphone and some without.

Examining the behaviors of the person with hearing loss and communication partner also would be an area for future research. In Caissie et al.'s (1998), they observed conversations between a person with hearing loss and someone with normal hearing and measured how long conversational turns lasted. Future research for the current study could involve a person with hearing loss and communication partner being observed in different environments with an observer measuring how often accommodations were being used.

One future research area that also related to the limitations of this study included targeting populations that had low *n* values for this study such as the age range of 76 and older, all relationships other than spouse/significant other, relationships where they knew the other person for 6-12 months, and various ratings of device time per day. This could provide a more complete picture whether these factors did or did not impact accommodation perceptions. In addition, trying to have more participants in general could increase the *n* for subfactors, which would lower type II error and increase the likelihood for statistical significance that would not be present from a low *n*.

The survey designed for this study could be implemented in a clinical setting. Developing the survey into a questionnaire to give to a patient with hearing loss and a communication partner could be used as a patient-reported outcome measure. For the survey to be used for a patient-reported outcome measure, conducting a larger study and testing how valid the survey was would be needed.

Clinical Implications and Conclusion

The main theme from this study was whether there was a difference in perception in accommodation performance for certain types of accommodations and certain factors. All statistically significant differences between the person with hearing loss's perception and the communication partner's perception were either a positive number, meaning the communication partner rated themselves higher at how well they accommodated than the person with hearing loss did or are within 3% of each other. This difference suggests that on average, the person with hearing loss generally did not rate the communication partner as better than the communication partner thought they themselves were at accommodating.

The main clinical implications of the research completed in this study related to aural rehabilitation. Whether statistically significant results were seen or not, the communication partner consistently rated themselves higher at how well they accommodated than the person with hearing loss thought they did. While this did not indicate if either view was accurate, it did indicate hearing healthcare providers might see patients who have discord with a communication partner due to differences in perceptions regarding how well the communication partner accommodated their hearing loss. In addition, this would leave room for improvement in both party's perception of the communication partner's accommodation performance.

During an appointment or aural rehabilitation class, the survey (see Appendix A) could be given to the person with hearing loss and the communication partner when deemed appropriate by the hearing healthcare professional. As several participants in the study reported that taking the survey opened dialogue to difficulties the pairs were having in accommodating the hearing loss, it is possible this could happen when facilitated by a hearing healthcare provider.

Regardless if the survey is given to patients, the reference to this research when talking with patients and their communication partners could potentially help them understand this difference in perception could be seen, especially in face visualizing accommodations, getting a person with hearing loss's attention before speaking, knowing each other for 6-10 years and for more than 10 years for overall face visualizing accommodations, and if the person with hearing loss rated their hearing loss as a mild to moderate handicap for overall accommodations. The hearing healthcare professional, the patient, and the communication partner could then work on solutions to help overcome

this difference in perception and work on strategies to allow both parties to rate the communication partner higher at how well they accommodated. Aural rehabilitation that included a spouse, significant other, or close friend could have many benefits. Preminger (2002) discussed that those with hearing loss who attended an aural rehabilitation class with a significant other had a much higher improvement in hearing handicap scores than those who attended alone. In addition, while the person with hearing loss's own rating of a hearing handicap improved, 46% of the significant others in Preminger's study had a worsening in their perceived hearing handicap of the person with hearing loss. This suggested the heightened awareness of what a person with hearing loss struggled with and the effort required for a person with hearing loss to hear allowed the significant others to subjectively feel the hearing handicap was worse than originally thought. This supported the use of the current study's results in aural rehabilitation. This could allow for more awareness from significant others on increasing their accommodation performance. It could also provoke a discussion between the two parties on what could be causing a discrepancy in perceived accommodation performance. As Hétu et al. (1993) discussed, focusing on one-side of the issue (either the person with hearing loss's or the communication partner's) could ignore the other's needs. Focusing on both sides could help with frustration and anger possibly experienced by both parties. Hétu et al.'s research would be beneficial to remember in discussing the current study's results in an aural rehabilitation setting. Addressing the difficulties both parties felt regarding requested accommodations for a hearing loss could reduce the frustration and anger felt and potentially lead to a solution.

Beyond the differences seen in perception in every accommodation in the current study, neither the person with hearing loss nor communication partner ever rated the communication partner as perfect at accommodating the hearing loss. This suggested the communication partner was aware they are not perfect in how well they accommodated the hearing loss. For hearing healthcare providers, acknowledging to a communication partner that the average communication partner did not feel they were perfect at accommodating a hearing loss with the communication partner might allow the communication partner to feel less guilt for not feeling perfect at accommodating the hearing loss. Lowering guilt could bring more motivation to find more ways to improve their perception on accommodating the hearing loss.

Hearing loss affects both the person with hearing loss and their communication partners with negative feelings, poorer quality of life, communication breakdown, extra effort, and isolation (Arlinger, 2003; Hétu et al., 1993, 1995; Preminger & Meeks, 2010; Stephens et al., 1995). The use of tools and all research to help decrease these effects is important. Using the knowledge gained from this study to help counsel patients could allow more understanding so they are not alone in the issue. It could also lead to discussions between a person with hearing loss and a communication partner on how to improve these discrepancies in perceived accommodation performance.

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APPENDIX A

SURVEY QUESTIONS

This survey is designed to compare responses from a person with hearing loss and a close communication partner on questions related to accommodations.

This short survey takes about 10-13 minutes to complete and is made up of multiple-choice questions as well as sliding scales. You will be routed to the appropriate questions based on if you are a person with hearing loss or a communication partner.

The Institutional Review Board (IRB) at the University of Northern Colorado has approved this research. Participation is voluntary, and you may decide not to participate in this study. If you begin this study, you may still decide to stop and withdraw at any time. You can leave the survey by closing the browser the survey is open on.

Risks to you are minimal. You may experience negative feelings if reflecting on the quality of accommodations either you're receiving for your hearing loss or you are providing to someone with hearing loss. Limited identifying information will be collected, which will only be used to pair a person with hearing loss's survey responses with their communication partner's. This identifying information will not be included in the results and will be discarded after surveys have been paired. Only the researcher and their research advisor will have access to results before or after identifying information is removed. No direct benefit is expected to a participant but can be helpful for professionals working with those with hearing loss. By completing this survey, you are giving permission to be included in this study as a participant.

If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, Kepner Hall, University of Northern Colorado, Greeley, CO, 80639; 970-351-1910.

If you wish to contact the researcher, please email Laura Schauer at scha2561@bears.unco.edu and if you wish to contact the research advisor, please email Dr. Tina Stoody at tina.stoody@unco.edu.

Are you answering this survey as a person with hearing loss talking about a close communication partner OR as a close communication partner answering about the person with hearing loss?

- ○ I am a person with hearing loss answering about how I feel a specific communication partner accommodates my hearing loss
- ○ I am a communication partner answering about how I feel I accommodate the person with hearing loss

---

Choose the best option for where you live:

- ○ Alabama
- ○ Alaska
- ○ Arizona
- ○ Arkansas
- ○ California
- ○ Colorado
- ○ Connecticut
- ○ Delaware
- ○ District of Columbia
- ○ Florida
- ○ Georgia
- ○ Hawaii
- ○ Idaho
- ○ Illinois
- ○ Indiana
- ○ Iowa
- ○ Kansas
- ○ Kentucky
- ○ Louisiana
- ○ Maine
- ○ Maryland
- ○ Massachusetts
- ○ Michigan
- ○ Minnesota
- ○ Mississippi
- ○ Missouri
- ○ Montana
- ○ Nebraska
- ○ Nevada
- ○ New Hampshire
- ○ New Jersey
- ○ New Mexico
- ○ New York
- ○ North Carolina
- ○ North Dakota
- ○ Ohio

- Oklahoma
- Oregon
- Pennsylvania
- Puerto Rico
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming
- I do not reside in the United States

Choose the best option for where the person with hearing loss lives:

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana

- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Puerto Rico
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming
- Does not reside in the United States

To match your responses to your communication partner's responses, please fill out the following information. This information is referred to as an "unique identifier" and will be removed after pairing survey results together and will not be included in any publishing.

Surveys do not have to be taken at the same time as the person with hearing loss.

- First three letters of the person with hearing loss's last name _____
- Month/day of the person with hearing loss's birthday (MM/DD) _____

To match your responses to the person with hearing loss's responses, please fill out the following information. This information is referred to as an "unique identifier" and will be removed after pairing survey results together and will not be included in any publishing.

Surveys do not have to be taken at the same time as the person with hearing loss.

- First three letters of the person with hearing loss's last name _____
- Month/day of the person with hearing loss's birthday (MM/DD) _____

Please check all that apply:

- ☐ I am 18 years of age or older
- ☐ I use English as a primary language
- ☐ A professional (doctor, audiologist, or hearing healthcare professional) has confirmed that I have a hearing loss in at least one ear
- ☐ I have known my communication partner for over six months
- ☐ My communication partner and I primarily communicate orally (speaking and listening)

What kind of relationship do you have with your communication partner?

- ○ Communication partner is my parent
- ○ Communication partner is my child
- ○ Spouse/significant other
- ○ Other family member
- ○ Friend
- ○ Other (ex. coworker, roommate, etc)

How long have you known your communication partner?

- ○ 6-12 months
- ○ 1-5 years
- ○ 6-10 years
- ○ 10+ years

How old are you?

- ○ 18 - 35
- ○ 36-50
- ○ 51-64
- ○ 65-75
- ○ 75+

What type of hearing device do you use in each ear?

	Hearing Aid	Cochlear implant	Bone anchored hearing device (ex. Baha, Ponto)	None
Right	○	○	○	○
Left	○	○	○	○

How often do you wear your hearing device(s) when awake?

- ○ Never
- ○ Sometimes
- ○ About half the time
- ○ Most of the time
- ○ Always

Which of the following best describes you? (Check all that apply)

- ☐ I have been using my hearing device(s) for less than a year
- ☐ I have been using my hearing device(s) for a year or more

Speaking accommodations: Have you asked your communication partner for any of the below accommodations? Please select the appropriate response below.

	Yes	No
Speaking louder	○	○
Speaking clearer	○	○
Speaking more slowly	○	○
Repeating or rephrasing what they said	○	○
Other speaking accommodations	○	○

How well do you feel your communication partner performs this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent

	Poor 1 2 3 4 5 Excellent
Speaking louder	
Speaking clearer	
Speaking more slowly	
Repeating or rephrasing what they said	
Other speaking accommodations	

Have you asked the communication partner for accommodations involving the ability to see his/her face while communicating? Please select the appropriate response for each accommodation below

	Yes	No
Facing you when they speak	○	○
Asking to see his/her face or mouth while speaking (Not blocked by their hands, clothes, or objects)	○	○
Getting your attention before they speak	○	○
Other accommodations to visualize their face better	○	○

How well do you feel your communication partner follows through with this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent.

	Poor 1 2 3 4 Excellent 5
Facing you when they speak	
Asking to see his/her face or mouth while speaking (Not blocked by their hands, clothes, or objects)	
Getting your attention before they speak	
Other accommodations to visualize their face better	

Have you ever asked your communication partner for environmental accommodations?
Please select the appropriate response for each accommodation listed below

	Yes	No
Turning down/turning off music, radio, TV, or other sources of sound	○	○
Sitting/standing on your better hearing side	○	○
Adjusting lighting or moving to a better lit location to allow their face to be better seen	○	○
Moving closer to you	○	○
Other environmental modification accommodations	○	○

How well do you feel your communication partner follows through with this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent

	Poor 1 2 3 4 5 Excellent
Turning down/turning off music, radio, TV, or other sources of sound	
Sitting/standing on your better hearing side	
Adjusting lighting or moving to a better lit location to allow their face to be better seen	
Moving closer to you	
Other environmental modification accommodations	

The purpose of this group of questions is to identify the problems your hearing loss may be causing you.

Check YES, SOMETIMES, or NO for each question. DO NOT skip a question if you avoid a situation because of your hearing problem. If you use a hearing device, please answer the way you hear WITH your device.

	No	Sometimes	Yes
Does a hearing problem cause you to feel embarrassed when you meet new people?	○	○	○
Does a hearing problem cause you to feel frustrated when talking to members of your family?	○	○	○
Does a hearing problem cause you difficulty hearing/understanding coworkers, clients, or customers?	○	○	○
Do you feel handicapped by a hearing problem?	○	○	○
Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?	○	○	○
Does a hearing problem cause you difficulty in the movies or theater?	○	○	○
Does a hearing problem cause you to have arguments with family members?	○	○	○
Does a hearing problem cause you difficulty when listening to TV or radio?	○	○	○
Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	○	○	○
Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	○	○	○

The purpose of this group of questions is to identify the problems your hearing loss may be causing you.

Check YES, SOMETIMES, or NO for each question. DO NOT skip a question if you avoid a situation because of your hearing problem.

If you use a hearing device, please answer the way you hear WITH your device.

	No	Sometimes	Yes
Does a hearing problem cause you to feel embarrassed when meeting new people?	○	○	○
Does a hearing problem cause you to feel frustrated when talking to members of your family?	○	○	○
Do you have difficulty hearing when someone speaks in a whisper?	○	○	○
Do you feel handicapped by a hearing problem?	○	○	○
Does a hearing problem cause you difficulty when visiting friends, relatives, or neighbors?	○	○	○
Does a hearing problem cause you to attend religious services less often than you would like?	○	○	○
Does a hearing problem cause you to have arguments with family members?	○	○	○
Does a hearing problem cause you difficulty when listening to TV or radio?	○	○	○
Do you feel that any difficulty with your hearing limits or hampers your personal or social life?	○	○	○
Does a hearing problem cause you difficulty when in a restaurant with relatives or friends?	○	○	○

Please check all that apply:

- ☐ I am 18 years of age or older
- ☐ I use English as a primary language
- ☐ I DO NOT have a hearing loss
- ☐ I have known the person with hearing loss for over six months
- ☐ The person with hearing loss and I primarily communicate orally (speaking and listening)

What kind of relationship do you have with the person with hearing loss?

- ○ Person with hearing loss is my parent
- ○ Person with hearing loss is my child
- ○ Spouse/significant other
- ○ Other family member
- ○ Friend
- ○ Other (ex. coworker, roommate, etc.)

How long have you known the person with hearing loss?

- ○ 6-12 months
- ○ 1-5 years
- ○ 6-10 years
- ○ 10+ years

How old are you?

- ○ 18 – 35
- ○ 36 – 50
- ○ 51 – 64
- ○ 65 – 75
- ○ 75+

Please select the age range for the person with hearing loss that you are filling out this survey in regards to.

- ○ Less than 65 years of age
- ○ 65 years of age or older

Speaking accommodations: Has the person with hearing loss asked for any of the below accommodations? Please select the appropriate response below.

	Yes	No
Speaking louder	○	○
Speaking clearer	○	○
Speaking more slowly	○	○
Repeating or rephrasing what you said	○	○
Other speaking accommodations	○	○

How well do you feel you follow through with this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent

	Poor 1 2 3 4 5 Excellent
Speaking louder	
Speaking clearer	
Speaking more slowly	
Repeating or rephrasing what you said	
Other speaking accommodations	

Has the person with hearing loss asked you for accommodations involving the ability to see your face while communicating? Please select the appropriate response for each accommodation below

	Yes	No
Facing them when you speak	○	○
Ensuring your face/mouth is visible (Not blocked by your hands, clothes, or objects)	○	○
Getting their attention before you speak	○	○
Other accommodations to visualize your face better	○	○

How well do you feel you follow through with this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent

	Poor 1 2 3 4 5 Excellent
Facing them when you speak	
Ensuring your face/mouth is visible (Not blocked by your hands, clothes, or objects)	
Getting their attention before you speak	
Other accommodations to visualize your face better	

Has the person with hearing loss asked you for environmental accommodations? Please select the appropriate response for each accommodation listed below

	Yes	No
Turning down/tuning off music, radio, TV, or other sources of sound	○	○
Sitting/standing on their better hearing side	○	○
Adjusting lighting/moving to a better lit location to allow your face to be better seen	○	○
Moving closer to them	○	○
Other environmental modification accommodations	○	○

How well do you feel you follow through with this accommodation?
Slide the bar to choose a number between 1 and 5 where 1=Poor and 5=Excellent

	Poor 1 2 3 4 5 Excellent
Turning down/turning off music, radio, TV, or other sources of sound	
Sitting/standing on their better hearing side	
Adjusting lighting/moving to a better lit location to allow your face to be better seen	
Moving closer to them	
Other environmental modification accommodations	

The purpose of this group of questions is to identify the problems the hearing loss may be causing the person with hearing loss.

Check YES, SOMETIMES, or NO for each question. DO NOT skip a question if you think the person with hearing loss avoids a situation because of their hearing problem.

If they use a hearing device, please answer the way they hear WITH their device.

	No	Sometimes	Yes
Does a hearing problem cause them to feel embarrassed when they meet new people?	○	○	○
Does a hearing problem cause them to feel frustrated when talking to members of their family?	○	○	○
Does a hearing problem cause them difficulty hearing/understanding coworkers, clients, or customers?	○	○	○
Do they feel handicapped by a hearing problem?	○	○	○
Does a hearing problem cause them difficulty when visiting friends, relatives, or neighbors?	○	○	○
Does a hearing problem cause them difficulty in the movies or theater?	○	○	○
Does a hearing problem cause them to have arguments with family members?	○	○	○
Does a hearing problem cause them difficulty when listening to TV or radio?	○	○	○
Do they feel that any difficulty with their hearing limits or hampers their personal or social life?	○	○	○
Does a hearing problem cause them difficulty when in a restaurant with relatives or friends?	○	○	○

The purpose of this group of questions is to identify the problems the hearing loss may be causing the person with hearing loss.

Check YES, SOMETIMES, or NO for each question. DO NOT skip a question if you think the person with hearing loss avoids a situation because of their hearing problem.

If they use a hearing device, please answer the way they hear WITH their device.

	No	Sometimes	Yes
Does a hearing problem cause them to feel embarrassed when they meet new people?	○	○	○
Does a hearing problem cause them to feel frustrated when talking to members of their family?	○	○	○
Do they have difficulty hearing when someone speaks in a whisper?	○	○	○
Do they feel handicapped by a hearing problem?	○	○	○
Does a hearing problem cause them difficulty when visiting friends, relatives, or neighbors?	○	○	○
Does a hearing problem cause them to attend religious services less often than they would like?	○	○	○
Does a hearing problem cause them to have arguments with family members?	○	○	○
Does a hearing problem cause them difficulty when listening to TV or radio?	○	○	○
Do they feel that any difficulty with their loss's hearing limits or hampers their personal or social life?	○	○	○
Does a hearing problem cause them difficulty when in a restaurant with relatives or friends?	○	○	○

APPENDIX B

INSTITUTIONAL REVIEW BOARD APPROVAL

UNIVERSITY OF
NORTHERN COLORADO

Institutional Review Board

DATE:	May 23, 2018
TO:	Laura Schauer
FROM:	University of Northern Colorado (UNCO) IRB
PROJECT TITLE:	[1236761-1] Comparing Perceptions Regarding Accommodation Strategies Used Between Adults with Hearing Loss and Their Communication Partners
SUBMISSION TYPE:	New Project
ACTION:	APPROVAL/VERIFICATION OF EXEMPT STATUS
DECISION DATE:	May 23, 2018
EXPIRATION DATE:	May 23, 2022

Thank you for your submission of New Project materials for this project. The University of Northern Colorado (UNCO) IRB approves this project and verifies its status as EXEMPT according to federal IRB regulations.

Laura -

Thank you for a clear and thorough IRB application. Your materials and protocols are verified/ approved exempt and you may begin participant recruitment and data collection. Please add UNC logo to the letterhead of your consent form as well as your research advisor's name and contact information before using this in your data collection. There's no need to submit a formal modification/amendment just make the small changes before using the form.

Best wishes with your study and don't hesitate to contact me with any IRB-related questions or concerns.

Sincerely,

Dr. Megan Stellino, UNC IRB Co-Chair

We will retain a copy of this correspondence within our records for a duration of 4 years.

If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX C

ADDITIONAL DATA

Audiological Demographic Information of Persons with Hearing Loss

	Paired
Device(s) Used	
Hearing Aid (unilateral)	3
Hearing Aid (bilateral)	26
Cochlear Implant (unilateral)	3
Cochlear Implant (bilateral)	7
Cochlear Implant and Hearing Aid	8
Bone Conduction Device (unilateral)	3
Bone Conduction Device (bilateral)	1
Bone Conduction Device and Hearing Aid	2
None	20
Duration of Device Use	
Less than one Year	6
One Year or More	47